VOLUME 41
NUMBER 5

MAY, 1954

plating

COLORIMETRIC DETERMINATION OF COPPER

See Contents Page 483

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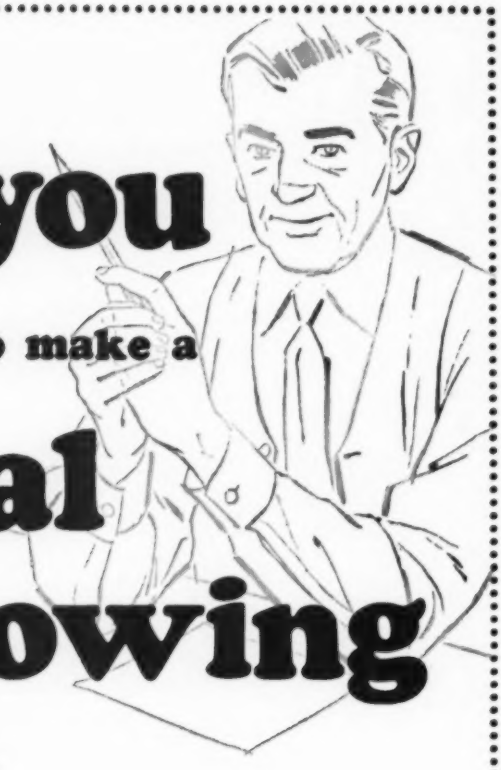

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In This Issue

Analytical Determination of Trace Constituents in Metal Finishing Effluents. III. The Colorimetric Determination of Copper in Effluents by Donald G. Gardner, Ralph F. Muraca, and Earl J. Serfass. The colorimetric procedure for the determination of the copper content of effluents in the range of 5 to 50 ppm is described. It was found to yield satisfactory results in the presence of as much as 5,000 ppm of each of twenty cations in simultaneous admixture as well as in the presence of organic materials and phosphates. The procedure can be shortened when less than 10 ppm of each metal are present, and a table summarizes the changes which can be made when the amounts of the elements other than copper are known or can be estimated.

Nickel Plating Troubles and Cures by O. A. Stocker, A. Korbelak, and S. A. Carrano. The paper is a trouble shooting chart, subdivided into 11 categories. Possible sources of trouble and suggested cures are given in each of the sections.

Radiometric Study of the Chromium-Sulfate Complex Formed in Chromium Plating Baths by Ronald L. Sass and Stanley L. Eisler. Tests conducted to determine the ionic nature of the coordination complex formed and the amount of sulfate so complexed are described. It was found that the chromium-sulfate complex formed is cationic in behavior and can be removed from the plating solution by employing the appropriate ion exchange media. Approximately 7 per cent of the total sulfate is bound up in the complex after electrolysis. The formation of a large complex ion is indicated by the fact that the per cent of sulfate regained from the resin column is considerably less than and independent of the amount of trivalent chromium regained.

Project No. 6—Porosity of Electrodeposited Metals. XIII. Variation of the Gas Permeability Constant with Pressure Difference by Dr. N. Thon and Douglas Dean. This is the final report from Project 6. It describes an improved permeability apparatus by means of which measurements have been made over larger foil areas. This apparatus has been used to study the variation of permeability as a function of the overpressure. With increasing overpressure, the permeability constant passed through a minimum in all cases.

For page numbers, see Table of Contents, page 483

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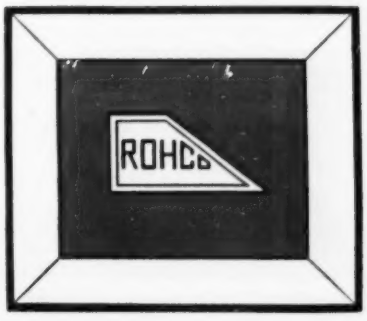

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Industry News

Boltaron PVC Canadian Distributors. Boltaron polyvinyl chloride products are now available to the Canadian market for industrial use wherever corrosion and rough treatment are problems. H. N. Hartwell & Son, Inc., Boston, Mass., announces two newly established distributors: the Vibra-Lite (Quebec) Reg'd, Montreal, and the A & A Distributors, Ltd., Vancouver, B. C. Additional outlets will be added in the near future.

"Chandeysson Room" Established by St. Louis Hospital. Complete furnishings for a private room were recently donated to Alexian Brothers' Hospital, in memory of the late Pierre I. Chandeysson, founder of Chandeysson Electric Co.

This gift is one of many received by the Hospital from the Chandeysson family. Their interest is underlined by the fact that Dr. Chandeysson in his lifetime was always devoted to the medical work of the Alexian Brothers.

While Chandeysson established an enviable reputation as a business leader, he never lost his love for medicine—the profession for which he had been trained. Although he was a practicing doctor only one year, he always maintained his memberships in the St. Louis and American Medical Societies.

Detrex Paint Bond Identity Sticker. Detrex Corp. of Detroit is now supplying customers who use its phosphate coatings with a new point-of-sale sticker to identify products protected by the Detrex Paint Bond process.

The die-cut sticker, lithographed in three colors, is designed to be attached by manufacturers of domestic appliances and metal products, thus tying in with Detrex' national merchandise program for its Paint Bond.

New Representative For Promat in Northern California. The Promat Division of Poor & Co., Waukegan, Ill., has announced the appointment of Industrial Materials Co., 383 Brannan St., San Francisco, as Northern California distributor for Promat metal finishing processes.

Lacky

Howard J. Lacky, Jr., owner of Industrial Materials Co., is a graduate of the University of California at Berkeley. The firm's activities cover Central and Northern California, handling supplies and equipment for the metal finishing industry.

Lead Handbook. A new "Lead Handbook for the Chemical Process Industries" has been published by Federated Metals Division, American Smelting and Refining Co.

The book, many months in preparation, is believed by many to be an important contribution to the chemical process industries. This latest compilation of data on lead and lead products discusses lead as a construction material, lists grades of lead, and furnishes detailed reference notes and conversion tables.

Beckman Opens New European Office, Manufacturing Plant. Opening of a branch assembly plant and European sales headquarters in Munich, Germany, has been announced by Beckman Instruments, Inc.

A FEW OF THE MANY
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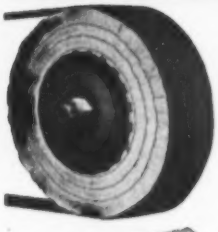

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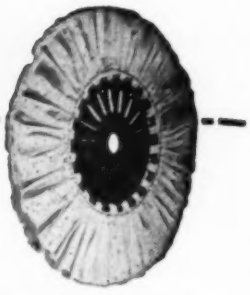

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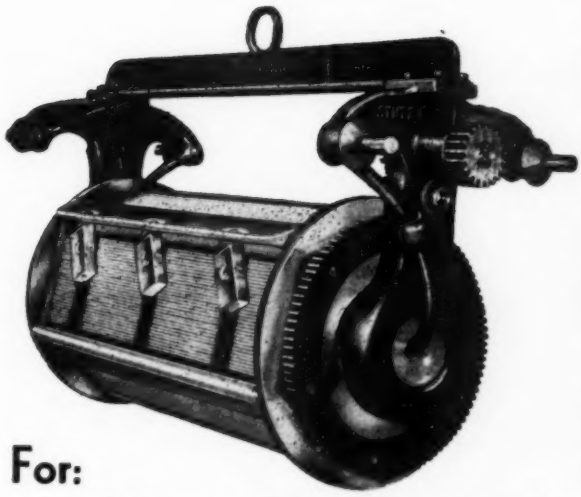

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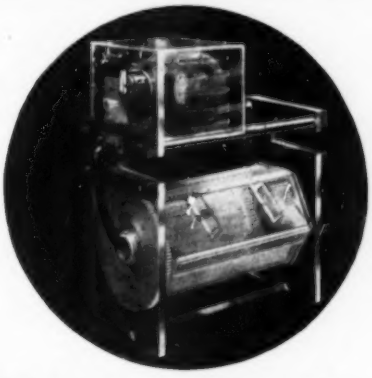

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Industry News

Founded as a corporation under German law, the new Beckman factory will be staffed chiefly by Europeans, with some key personnel transferring from the company's U. S. plants. Production initially will be limited to portable *p*H meters and quartz spectrophotometers.

The European sales and service office will cover 18 countries overseas—including the United Kingdom, Germany, France, Italy, Spain, Switzerland, the Netherlands and Scandinavian countries.

Harold Zander, a U. S. citizen, will direct this office, assisted by Friedrich Schroeder and Joachim De Vos, graduate engineers who have received intensive training at various Beckman factories in this country.

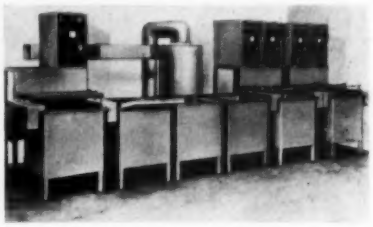
Address of both the German factory and European sales headquarters is Elektron Instruments G.m.b.H., Gröbenzellerstrasse 13, Munich-Puchheim, Germany.

Normal Delivery Schedules for Diamond Grinding Wheels. Norton Co. of Worcester, Mass., announces that diamond grinding wheels are now on normal delivery schedules.

Many of the standard sizes are available for immediate delivery from the plant, Norton warehouses and dealers' stocks. Manufacturing time for other wheels is from 3 to 4 weeks.

During the recent diamond shortage, Norton instituted a swarf reclaiming department to which customers could send grinding swarf and be credited with the diamonds which were salvaged. Wheel stubs also were salvaged. Because of the savings in grinding costs which customers have been able to realize in this manner, Norton plans to continue the salvage of diamonds from swarf and stubs.

Wagner Brothers Hold Open House. An "open house" to demonstrate a new hard chromium plating unit was held by Wagner Brothers, Inc., in Detroit recently.



Cutting tool life has been increased up to 1000 per cent by their hard chromium surfacing method, the company states. Employing the "Morey Process," the complete set of five tanks, five rectifiers, a fume separator, automatic heating elements and controls enables manufacturers to set up their own production hard chromium department with a minimum of installation cost and provides precision deposition and control of plate thickness and greater throwing power into grooves and recesses. Included in the package is two weeks of thorough instruction to enable an inexperienced operator to get precision results formerly obtainable only by experts, according to company officials.

Wallace & Tiernan—Novadel Agene Merger Announced. Martin F. Tiernan, Chairman of the Board, announced that on the merger of the associated companies, Wallace and Tiernan Co. Inc. and Novadel-Agene Corp., into a single organization known as Wallace & Tiernan Inc., was completed. Subsidiaries include W. C. Hardesty Co., Inc., Richmond Manufacturing Company, Thomson Machine Co., Electro Rust-Proofing Corporation (N. J.) and Wallace and Tiernan Ltd.

Engineering and pharmaceutical lines with the Novadel flour milling and chemi-

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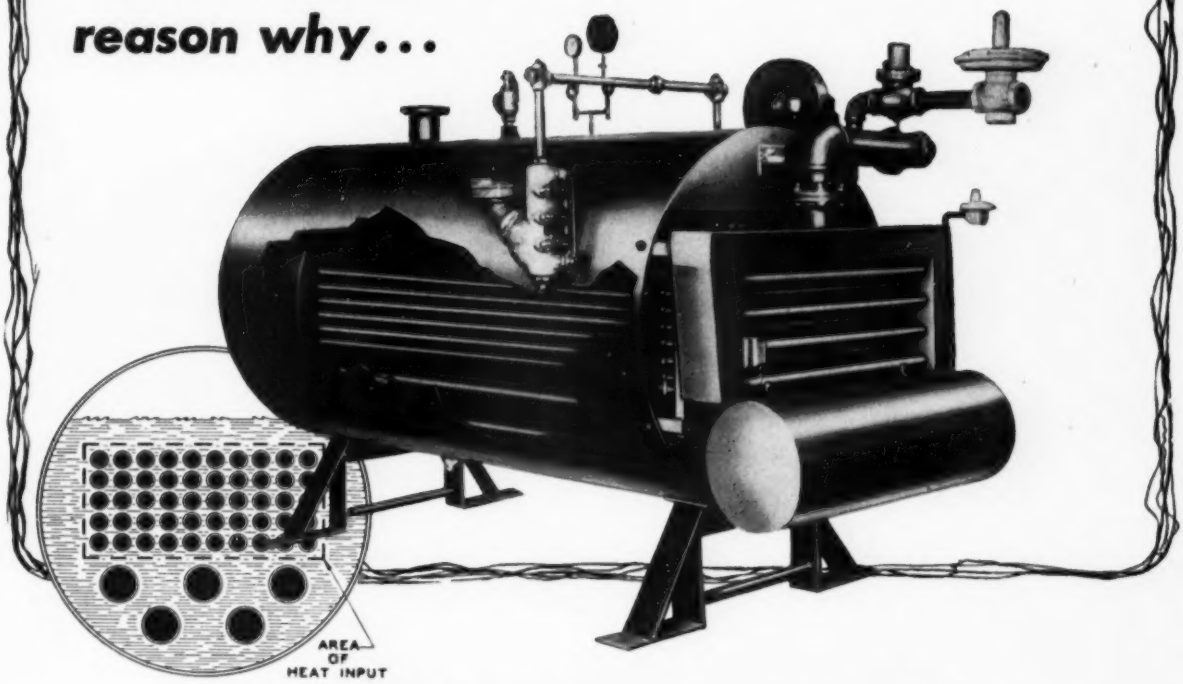

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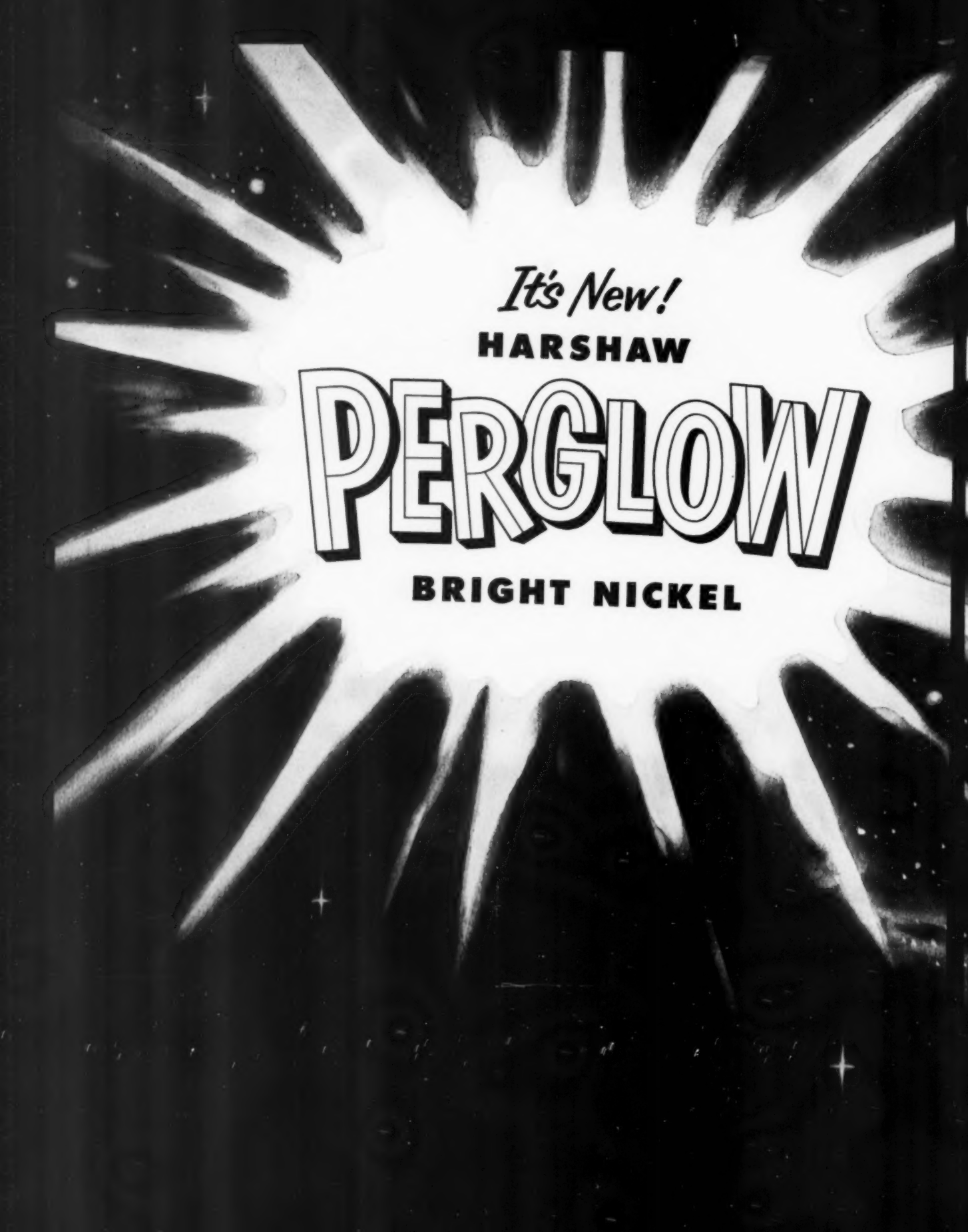
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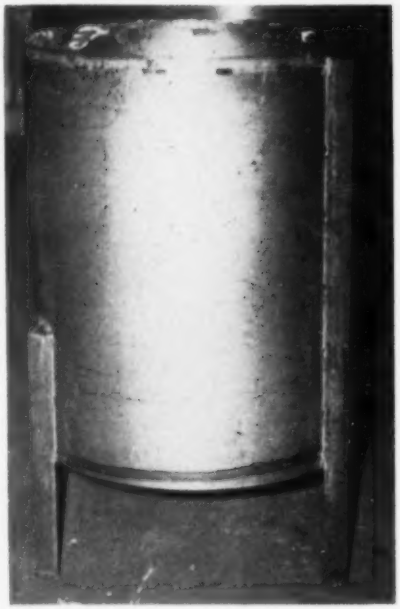

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Industry News

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The new company's principal lines of activity include: chlorinators, water purification apparatus, chemical feeders and materials handling equipment, and cathodic protection services.

Wyandotte Chemicals To Build New West Coast Plant. Wyandotte Chemicals Corp., in February began construction of a new plant at Los Nietos.

The plant site is in Los Angeles County, 16 miles southeast of the city of Los Angeles. Ford Ballantyne, Jr., vice-president and general manager of the J. B. Ford Division of Wyandotte Chemicals, said production in the new plant is scheduled for August. At that time manufacturing will be discontinued at the present Wyandotte plant on College St., Los Angeles, which has been in operation since 1950.

The new buildings will be of the modern functional type and will contain research and technical service laboratories, manufacturing and shipping facilities, as well as the Los Angeles district sales office of this Wyandotte, Mich., firm.

Vacuum Coating Patents to National Research Corporation. National Research Corporation, 70 Memorial Drive, Cambridge, Mass., has been granted ten U. S. patents in the continuous vacuum

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A live wire Plating General Foreman. Experienced in copper, nickel, and chrome, semi and fully automatic equipment. Must be a go-getter, handle labor well, take the laboratory's suggestions and ideas and carry them out in a practical way. Excellent opportunity for proper individual. Detroit area.

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- **SUPERIOR** Deposits with less tendency for roughness, caused by metallic impurities such as might be introduced with hard water.
- **SUPERIOR** Cost Savings when used at recommended concentration; where operating characteristics of standard and bright baths utilize Rochelle Salts at 6 oz./gal., SUPERTARTRAL offers 20% savings over Rochelle Salts and 23% saving over Potassium Tartrate.
- **SUPERIOR** Cyanide Stability... Lea-Ronal SUPERTARTRAL reduces cyanide breakdown with its resultant carbonate formation.

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LEA-RONAL Products are the result of careful research and development which guarantees that they are not put on the market until ready.

Don't you think that your constant search for improving plating operations and for lowering costs, warrants thorough investigation and trial of LEA-RONAL SUPERTARTRAL?

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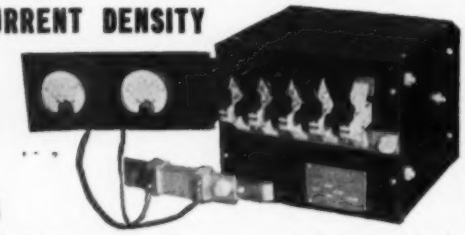

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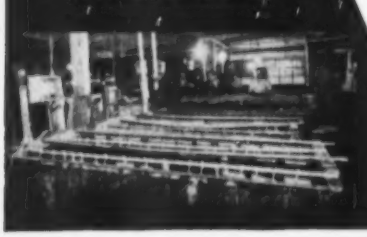

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Industry News

coating field. The continuous vacuum coating process employs the same principles as the batch coating process for the deposition of aluminum or other metals upon rolls of flexible material, such as plastics, textiles, and paper. Patent numbers of the grants are: 2,664,852-3; 2,665,-223 through 2,665,229 and 2,665,320.

Carborundum Company Purchases American Tripoli Corp. Agreement has been reached for The Carborundum Company to acquire the capital stock of American Tripoli Corporation of Seneca, Mo., according to an announcement by General C. F. Robinson, president of Carborundum in Niagara Falls, N. Y.

The purchase thus completes the negotiations that have been under way for the past year with the J. C. Miller Co., Grand Rapids, Mich., until now the owners of the American Tripoli Corp.

Robinson said the American Tripoli Corporation owns deposits of and a plant for the production of "Seneca Standard" Tripoli, an unusual form of silica found in the foothills of the Ozark Mountains.

Applications for the material include buffing and polishing compounds, lacquer finishing compounds, metal polishes, foundry parting, detergents, cleaners and polishing cloths. Research is presently developing additional uses for this remarkable mineral as a catalyst carrier in petroleum cracking and other industries.

"The purchase of American Tripoli Corporation, closely related to the abrasive industry, is a further extension of Carborundum's policy of diversification into kindred product lines of the parent firm," Robinson said.

M-H Field Sales Force Appointments. Sixteen sales engineers were recently added to the field sales force of Minneapolis-Honeywell Regulator Company's Industrial Division in 12 branch offices located in 11 U. S. and 2 Canadian cities.

At the same time 20 service engineers were added to the firm's field sales force.

The new sales engineers, all graduates from the company's industrial instrument training school in Philadelphia, include: K. J. Lesker, Dallas; O. E. Krienke, New Jersey; W. J. Boschert, St. Louis; W. G. Henderson, Chicago; R. P. Norton, Indianapolis; W. J. Young, Houston; W. C.

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The convenient little pellets will do these things for you:

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3. Sharply reduce rinsing requirements and rinse contamination!
4. Eliminate the necessity for water wash systems!
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6. Eliminate, often completely, chromic acid stains!

ZERO-MIST is indestructible — only infrequent drag-out replacement additions are necessary.

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Watch your profits grow when you add ZERO-MIST. This wonderful, cost-cutting chemical is a 6-way performer, one that pays for itself a hundredfold. Put it to work today!

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Cut anode costs more than 1/2!

For a given length of anode rod you may, for example, buy three 22-inch, 3-rib conventional extruded lead anodes.

*Price would probably be about $5.60 each. Total: $16.80.

These anodes would last you about 9 months in normal service.

Cost per month: $1.87.

For the same length of anode rod you would need two 22-inch Conducta-Core anodes at about $17.50 each. *Total: $35.00.

BUT the Conducta-Core anodes will last you 3½ years!

Cost per month: $.83!

The answer is the unique design. The challenge is to see for yourself. Try Conducta-Core now.

These prices are approximate. They vary with market conditions but since both are dependent upon the price of the base metals of which they are made, the relation between them remains much the same.

Photo courtesy U. S. Metals Coatings Co., Inc., Elizabeth, N. J.

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Industry News

Curp, Dayton; W. T. Lisenby and J. T. Gentry, Los Angeles; J. L. Ciprari, Minneapolis; K. Batchelor, Houston; W. L. Bolton, Atlanta; R. J. Raycroft, Toronto; T. M. Hunt and W. F. Harrison, Montreal and H. E. Allison, International Division.

Magnus Chemical Drums Redesigned. The advertising and promotional value of a good package design is dramatically demonstrated in the drums recently redesigned for the Magnus Chemical Co. of Garwood, N. J. The large drums for the variety of chemical cleaners and lubricants manufactured and distributed under the Magnus trademark have been changed from orange to black lettering on which the trademark and product name were hardly noticed to a dramatic orange blue and white design on which the trademark and brand name are dramatic and eye-compelling.

Errata Sheet ACS Monograph 118—"Industrial Waste Treatment." In the editorial work on the section on plating wastes in ACS Monograph 118—"Industrial Wastes Treatment" the bibliography was shifted from a consecutive numbering system to an alphabetical order system. Unfortunately, in making this change a great many errors were introduced, particularly in that the reference numbers in various tables of data were not changed from the original system. The authors regret this confusion but must disclaim responsibility, since they received no proof before publication. An errata sheet has been prepared to endeavor to clear up the situation. Copies may be obtained by writing to M. G. Burford, Hall Laboratory of Chemistry, Wesleyan University, Middletown, Conn.

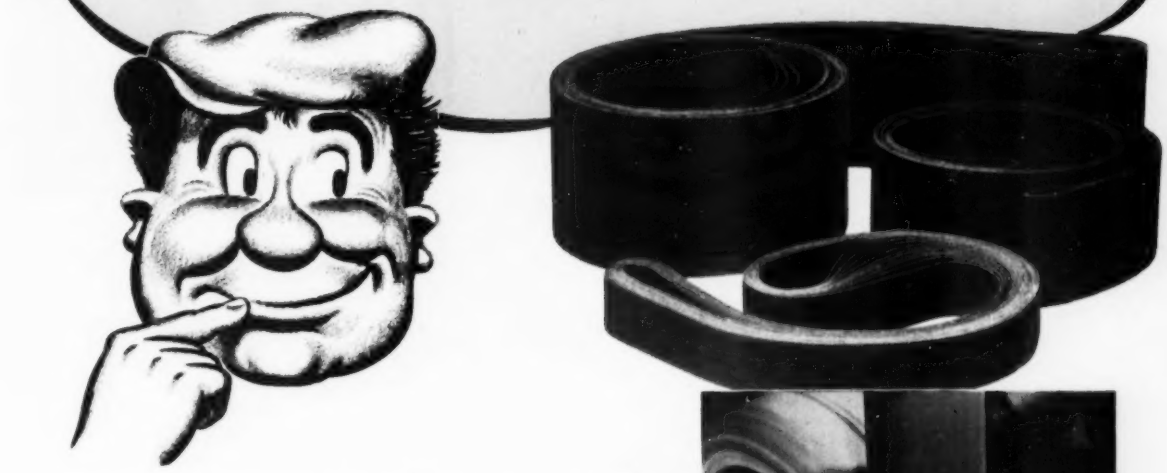
High Vacuum Symposium. The Committee on Vacuum Techniques announces that a High Vacuum Symposium will be held at the Berkeley Carteret Hotel at Asbury Park, N. J., on June 16, 17, 18, 1954.

Papers are being selected for presentation in five major categories, which include:

1. Panel on nomenclature and standards
2. New equipment and instruments
3. Fundamental developments in vacuum technology
4. Methods and techniques
5. Applications and processes

Dr. K. C. D. Hickman, a pioneer who has received numerous patents in the high vacuum field, will be Honorary Chairman of the symposium. All individuals and companies interested in attending the symposium, presenting papers, or participating in other activities of the Committee on Vacuum Techniques, are urged to write to P. O. Box 1282, Boston, Mass.

Which Behr-Manning abrasive belt is best for your polishing job?



You can slash contour and flat polishing costs – and get a better finish too – when you use the *right* BEHR-MANNING® coated abrasive belt *and* finishing method. You have a wide selection to choose from. For example:

RESINALL® METALITE® Belts, made with a double bond of thermo-setting resins, resists the heat of heavy duty grinding.

RESINIZED® METALITE gives you a resin sized belt for "high-heat" operations in finer grits.

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USE THE ASSISTANCE OF THE BEHR-MANNING FIELD ENGINEER in making your selection. His training and experience will be invaluable in deciding on, not only the right belt, but also the correct grit size, backing and application method. By actual test, in your own plant or in a nearby BEHR-MANNING Demonstration Room, the most efficient combination for your need can be worked out. Make a date now. Write Behr-Manning Corp., Troy, N. Y., Dept. PL-5

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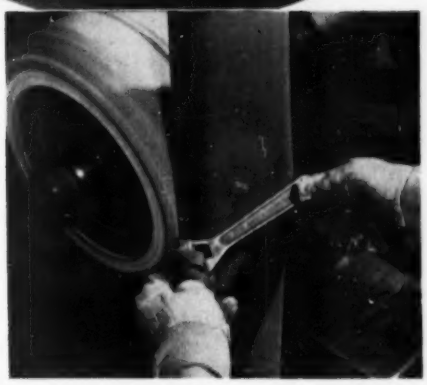

Contour grinding with BEHR-MANNING abrasive belt and a shaped contact wheel.

Polishing inside contours of small parts with a narrow belt running over a "finger" while part is moved in an arc.

For the newest in coated abrasives . . . watch BEHR-MANNING!

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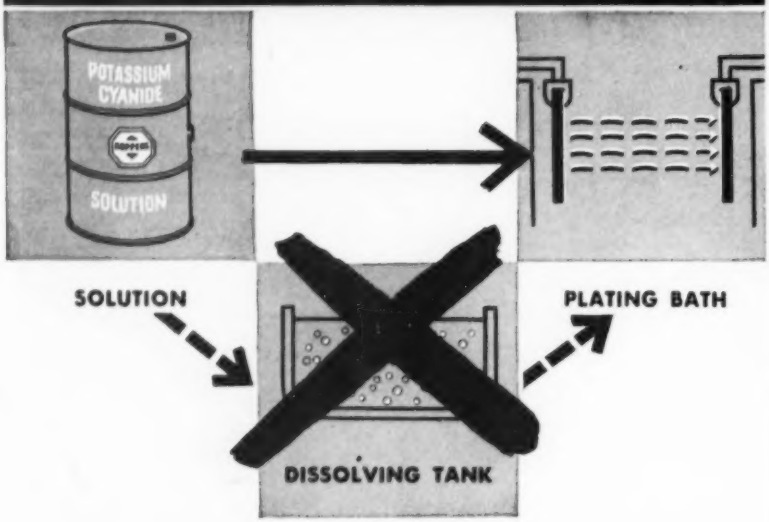

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KOPPERS Potassium Cyanide Solution (35-40%) eliminates the dissolving step in your plating operation. It is delivered to you, ready for the plating bath. Time-consuming preparation is out. There are no dangerous cyanide granules to handle, no drum cleaning, and no need to expose working personnel to cyanide powder dust.

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Personals

E. H. Peterson, of Scotch Plains, N. J., has been named sales manager by the Magnus Chemical Co., Garwood, N. J.

Peterson

With Magnus since 1947, Peterson has served in engineering and sales capacities, and was appointed assistant to the president in 1952. He formerly was associated with Shaw Insulator Co., Irvington, N. J., and with Stewart, Dougall and Associates, management consultants, in New York.

A graduate of Worcester Polytechnic Institute, he holds a master's degree from Stevens Institute of Technology, and is a doctoral candidate at New York University. He is a member of the Tau Beta Pi national honorary engineering fraternity, the American Management Association, the American Marketing Association, and is a licensed professional engineer, in the state of New Jersey.

Gottfred L. Hendrickson has been appointed resident sales engineer to serve the Minnesota, North Dakota and South Dakota area by the Udylite Corp., Detroit, Mich.

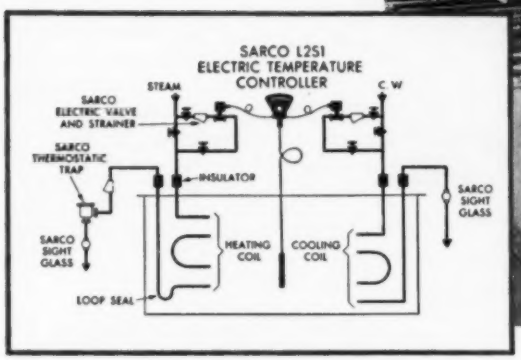
Hendrickson

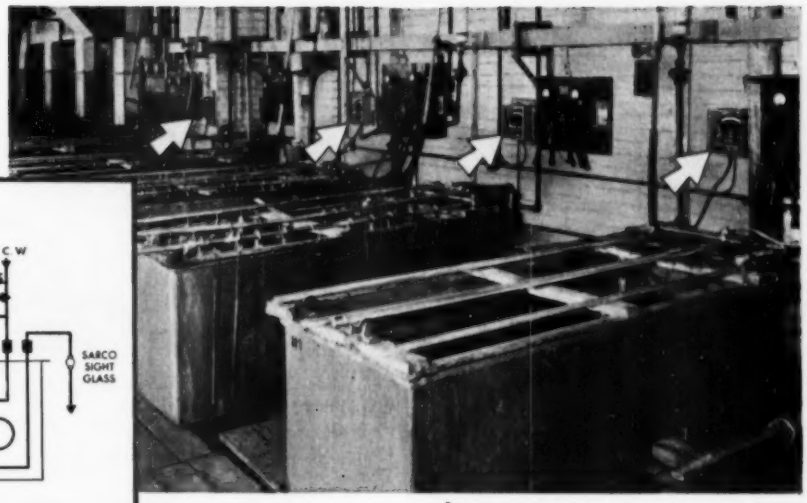
Hendrickson has 20 years of experience in metal finishing which includes supervision of metal finishing at McGraw Electric Co. in Elgin, Ill., and at General Mills Home Appliance Dept. in Minneapolis.

He will service the area from his office at 1834 Lincoln St., N. E., Minneapolis, Minn.

Kermit D. Collom and **Stanley E. Jacke** have been named to the staff of the new Ultrasonics Division of the Detrex Corporation of Detroit.

Collom will be in charge of sales, instal-





▲ Over 30 Sarco Electric Temperature Controllers help maintain high quality plating at Ronson Art Metal Works, Inc., Newark, N. J. Controllers are used on chrome, nickel, copper, silver and gold plating tanks.

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RONSON, manufacturer of the "World's Greatest Lighter," knows that high quality plating depends upon close control of many variables, the most important of which is the bath temperature.

They know that erratic bath temperatures usually result in costly rejects, wasted man hours, and dissociation of expensive solutions.

In 1948, Ronson made trial installations using Sarco LSI Electric Temperature Controllers and other competitive devices. The Sarco LSI's proved superior on all counts: dependability, cost, ease of installation, and maintenance.

As a result, LSI's are now standard equipment at Ronson. Mr. J. Rembecki, metallurgical engineer, reports that Sarco LSI's have given trouble-free service for over five years.

For information on how Sarco LSI's can cut your plating costs, ask for Bulletin No. 6. Call your local Sarco agent, or write direct to Sarco Company, Inc., Empire State Bldg., New York 1, N.Y.

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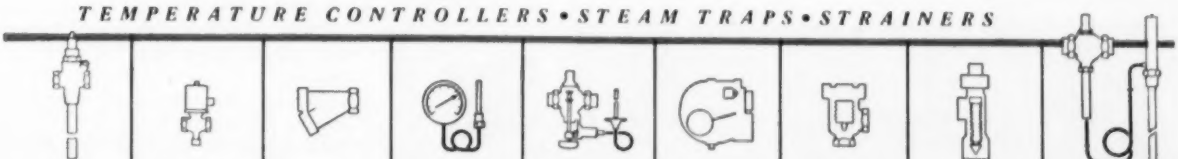
Can hold bath to ±1° F.; settings changed by turning one knob. Provides automatic control of heating and cooling to help prevent:

- Changes in current density
- Variations in plate thickness
- Variations in quality
- Dull finishes
- Breakdown of plating solutions
- Crystallization of salts

2023 C

SARCO *improves product quality and output*

TEMPERATURE CONTROLLERS • STEAM TRAPS • STRAINERS



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Personals

lation, and servicing of the new Detrex Sonicleen machines. Jacke's duties will be devoted entirely to applied research in the ultrasonics field.

Prior to joining Detrex, Collom was employed by the Weltronic Corp. Detroit, for nine years doing applied research in induction and dielectric heating. For four years he performed nondestructive testing experiments in General Electric's Lockland, Ohio, laboratories. A graduate of the University of Wisconsin, Collom has degrees in chemical and electrical engineering.

Jacke, a graduate of Purdue University in electrical engineering, was on the research staff of the Delco-Remy Division of General Motors for three years.

M. E. Powers has been appointed manager, Government Sales Department by the J. B. Ford Division of Wyandotte Chemicals Corp. He will headquarter at Wyandotte, Mich., and will work closely with the personnel of the new Wyandotte Chemicals Research Center in the development of products to meet military specification.

Powers

Powers has done graduate work at Boston College where he majored in Chemistry. He also studied accounting and contract law at Boston University. He joined Wyandotte Chemicals in 1940 and became manager of their New England sales office in 1946.

F. G. Merckel has been elected president, **R. M. Jackson,** executive vice president and treasurer and **G. D. Peet,** vice-president in charge of product engineering and development following the merger of Wallace & Tiernan Co., Inc., and Novadel-Agene Corp., to form Wallace & Tiernan, Inc.

Merckel

Jackson

Peet

Merckel, an engineer by training, has been with the W&T group in various executive and sales capacities for nearly 35 years.

Jackson has been associated with the organization for over 20 years, and treasurer for the past several years.

Peet has been with W&T almost since its inception. He has been chief engineer as well as an officer of subsidiary companies.

Charles F. Norcross has been appointed national sales manager by the Ther Electric & Machine Works, Chicago, manufacturers of selenium rectifiers for plating, anodizing and other industrial applications.

Norcross received his electrical engineering training at Rensselaer Polytechnic Institute and joins the Ther Electric organization with several years of field engineering experience with rectifier installations for electroplating purposes. He

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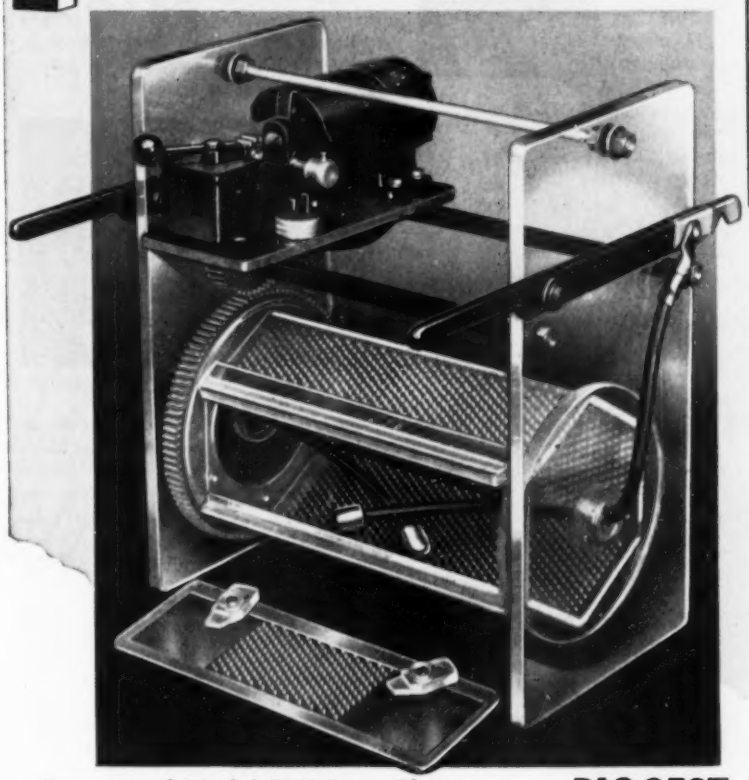

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115 V, 60 C, 1 Ph. Motor

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Features of Model SPX Porto-Plater

Notched "V" Cathode Contact fits Cathode Rod at any point on the rod.

Complete Lucite End Plates — Support plater — protect cylinder and mechanism in handling.

Reversing Switch with self-contained motor drive —Motor turns cylinder in either direction and holds positively for loading and unloading.

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Cylinder perforations 3/32" unless specified.

Cylinder, O.D. 9x15"; I.D. 6x12".

Weight Empty, 28 lbs. Plating Capacity, ¼ peck.

Geared head motor, 1/50 HP, 115 V, 60 C, 1 Ph.

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EVERYTHING FOR PLATING PLANTS

Personals

is well known in the field, having been instrumental in engineering some of the largest rectifier installations in the country. He will make his headquarters at Ther Electric's main office at 17 S. Jefferson St., Chicago.

A. W. Stoddard has been named director of public relations and advertising by the Detrex Corporation of Detroit.

Stoddard formerly was director of advertising and assistant to the executive vice-president for the Syncro Corp. of Oxford, Mich.

Alan A. Hutchings, sales manager of the F. J. Stokes Machine Co., Philadelphia, Pa., has been elected to the newly created position of vice-president in charge of sales.

Hutching's joined the Stokes organization in 1940 as a sales engineer, specializing in plastics molding equipment. In

Hutchings

1946, he was put in charge of all plastics sales and service. His duties were further extended in 1950 when he was named general sales manager for all Stokes equipment.

A native of Chicago, Hutchings was graduated in 1933 from the University of Minnesota with a B.S. in Mechanical Engineering, and in 1935 from the Wharton School of Finance of the University of Pennsylvania with an M.B.A. degree. Before joining the Stokes' sales staff, he was a sales engineer with SKF Industries, Inc., Collins & Aikman Corp., and Carrier Corp.

William N. Jove, field engineer for the Norton Co in the Chicago area, has retired after a career of over 51 years and **William D. Bennett,** abrasive engineer for the company in Cleveland, has retired after 46 years of service.

Jove

Bennett

Jove started with Norton as an errnda boy at the Chicago store at the age of 13. Later he became a member of the outside sales force as an abrasive engineer and field engineer, always in the Chicago area.

Bennett began his career as an office boy, later working in the order, sales quotation and sales engineering departments before being sent to Cleveland in 1930 as office manager. Since 1931 he has been an abrasive engineer in the Cleveland area.

Harlan W. Cobb has been named to succeed Bennett. Another longtimer with 37 years' service in Norton's employ, Cobb has been at Cleveland since 1929.

In another change among Norton sales personnel, **Fred J. Benn** was appointed abrasive engineer and will be responsible for a new territory created by dividing the territory formerly covered entirely by **Sherwood F. Prescott.** Benn will center his activities in Louisville, Ky., and cover a large portion of that state. Prescott will continue his residence in the Cincinnati area and cover his portion of the territory which includes southern Ohio, and eastern Indiana.

William Reibitz, formerly field engineer in Detroit, has been appointed abrasive engineer in the Detroit area, exchanging jobs with **Allan Jaques.**

Marion F. Wilson has joined the sales staff of the Northwest Chemical Co. to service accounts in Kentucky, Tennessee, and parts of Indiana.

Wilson, a long-time resident of Kentucky, is a graduate of the University of Louisville, and a member of the American Society of Tool Engineers.

For the last several years, he has

a good pattern
for you to follow
completely sealed
SELENIUM
RECTIFIERS
An analysis of the plants using SEL-REX equipment reveals an eye-opening picture — the majority of the hundreds of SEL-REX equipped plants are world-famous for the quality of their products. These companies represent practically every industry using plating . . . decorative and industrial.
Such an outstanding record cannot be ignored. Place your plant in the SEL-REX pattern and enjoy uninterrupted service WITHOUT costly maintenance. SEL-REX REACTRONICALLY CONTROLLED RECTIFIERS are sealed against dirt, moisture and corrosive fumes. There is a SEL-REX water-cooled or standard air-cooled rectifier for every application.
Literature and names of SEL-REX equipped plants on request. Write to Dept. PL-5.
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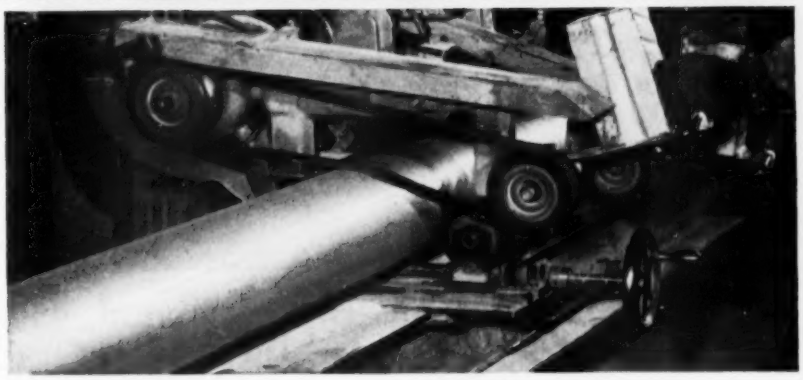
SEL-REX RECTIFIERS for every requirement from 25 to 50,000 amperes

HOW WOULD YOU Solve it?

1 PRODUCTION PROBLEM:

To cut unit costs of polishing aluminum street lighting standards. Pfaff & Kendall, Inc., was finishing one 30-foot pole per hour by hand sanding its entire length as it rotated in a lathe bed.



2 SOLUTION:

A 3M Representative suggested that this Newark, N.J. manufacturer switch to the 3M Method using Three-M-ite Resin Bond belts installed on two swing grinders mounted in tandem. Poles were rotated in the lathe bed as before. Polishing was done *behind* the contact wheel on the unsupported belt.

3 RESULTS:

An immediate production increase from 1 to 4 finished standards per hour, with a higher quality finish. Each belt finishes 10 or 11 poles, with far less operator fatigue. A 3M Representative can help *you* solve your polishing problems, too. His services are available without cost or obligation. Send coupon for facts.

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Personals

worked with the metal finishing industry. This experience, augmented by special training given by the Northwest Chemical Co., enables him to render technical service of a high order.

Charles W. Smith has been selected as the newest representative in the Chicago area for the Frederic B. Stevens, Inc., Detroit 16, Mich.

Smith will specialize primarily in the Stevens line of metal finishing compositions.

Prior to joining Stevens, Smith had accumulated 26 years' experience in the metal finishing fields. He has spent 3½ years as a superintendent at Craftsman's Plating and Tinning Co., Chicago; 4 years as superintendent of plating, polishing and buffing at Driscoll Co., Chicago; and over 3 years in the same capacity at the Webster-Chicago Corp.

Smith

He specialized in chemistry while at school and has been a member of the Chicago Branch AES for the greater part of 20 years.

John M. Davidson has been appointed assistant sales manager of the Metal Processing Department of the Pennsylvania Salt Mfg. Co., Philadelphia, Pa.

In his new position, Davidson will be responsible for all field activity and for the supervision of product-sales supervisors. Before this appointment, he was supervisor for Pennsalt cleaners, after serving as Philadelphia district sales manager for industrial chemicals.

Davidson

Davidson, a graduate of Dickinson College, earned his Master's degree at Temple University. He is a member of the AES and of the Chemical Club of Philadelphia.

Also announced was the recent appointment of **Charles R. Sorber, Jr.**, as Cincinnati district supervisor.

Sorber, who served as sales representative in several territories, will make his headquarters in Cincinnati. He will supervise sales in the Indianapolis-Louisville, Columbus, and St. Louis territories covered by **A. S. Engle, J. O. Cram, Jr.,** and **F. E. Wilcher.**

Sorber is a graduate of Penn State University and joined Pennsalt in 1947.

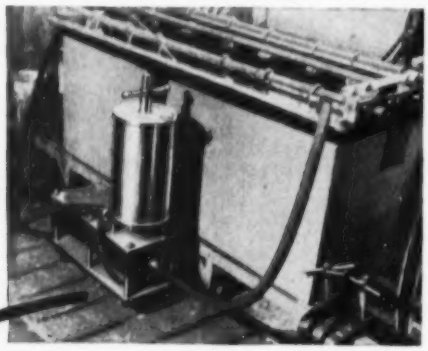
F. Jerome Tone, Jr., was made senior vice-president and **Frederick T. Keeler** was appointed director of sales for The Carborundum Co., according to a recent announcement.

Tone, a native of Niagara Falls, was graduated with a B.A. degree from Cornell University in 1924. He began his business career as a salesman with the American Radiator Co. In 1926 he joined The Carborundum Co. and served for 9 years as a salesman for the company in the Detroit district. In 1935 he returned to Niagara Falls where he served in various executive posts. Elected vice-president and member of the board in 1942, subsequently he was elected vice-president, sales, the position he held prior to becoming senior vice-president of the company.

Keeler, a native of New York City, received a B.A. degree from Hamilton College in Clinton, N. Y., and was graduated from the Harvard Business School with an M.B.A. degree in 1935.

Keeler joined the Crowell Collier Publishing Co. in 1935 and consecutively held positions in sales promotion, merchandising, and market research. He came to Carborundum in 1943 as a sales analyst.

CHECK the advantages of using a "Sealed-Disc" Filter



YOU'LL . . . be impressed too . . . with these proved performance features.

Models for any size or type installation in Stainless Steel, Monel Metal, Plain Iron, etc.
Small, compact—requires exceptionally small floor space coupled with remarkable filtering speed and volume.
Completely enclosed and air tight—eliminates loss of liquid from dripping.
"Sealed-Disc" Filters are complete as shown—slurry mixing tanks are not needed—filtering powders are not generally required.
Simplicity of design assures savings in operating time and labor with positive trouble-free performance.

EVERY PLATER WHO USES A "SEALED-DISC" FILTER IS IMPRESSED WITH ITS POSITIVE, TROUBLE-FREE PERFORMANCE.

Regardless of the size or type of your plating installation, there's a *"Sealed-Disc"* Filter *"to fit your job"*—you can depend on these proved performance features—you can be sure that all dirt, sludge, and even the invisible impurities are removed from your plating solutions.

"Sealed-Disc" Filters were designed especially to meet plating room requirements. They are smaller, more compact and portable than ordinary Filters, yet they are capable of handling equal volumes of solutions. Ask your regular plating supplier to tell you about the *"Sealed-Disc"* Filter that has helped so many platers get better finished plated work with savings in time and labor—or write for details.

ALSOP ENGINEERING CORPORATION
905 FINE STREET • MILLDALE, CONNECTICUT

OTHER ALSOP PLATING ROOM EQUIPMENT.
We manufacture a full line of Mixers and Agitators covering a complete range of sizes, for mixing, blending and dissolving. Stainless Steel Mixing Tanks are also available in a wide range of capacities. For full details and illustrations write for your free catalogue.

BRP

ELECTROLESS NICKEL

Deposits a uniform thickness on any irregularly shaped part.

Thickness of .003 can be made with excellent adhesion.

Corrosion-resistance properties are superior to those of electroplated nickel.

Hardness similar to that of hard nickel and can be increased by heat treating.

Solutions are shipped in concentrated form, in order to reduce handling and storage requirements.

Our experienced personnel, with years of experience in the operation of Electroless Nickel, assures you competent service engineers for the correct solution of your individual requirements.

[A CATALOG FULLY DESCRIBING OUR PROCESS IS AVAILABLE]

THE VEA CHEMICAL CO.

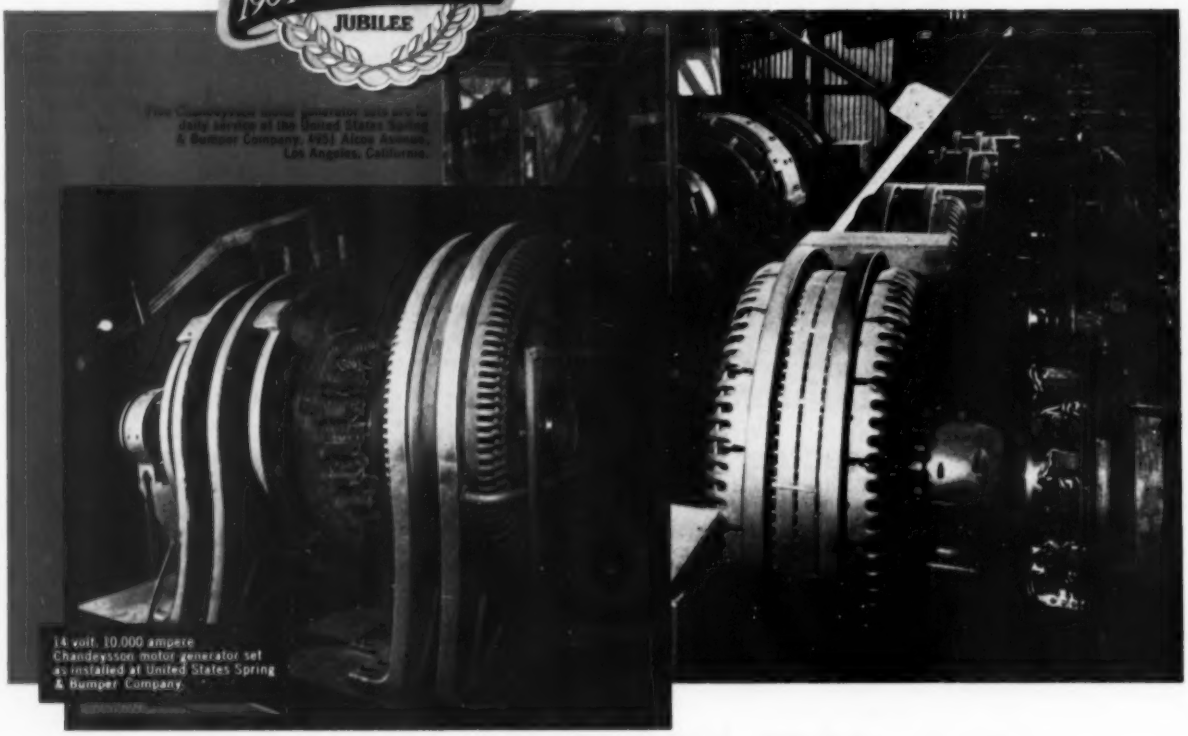
MANUFACTURING CHEMISTS TO THE METAL FINISHING INDUSTRY

1217 MAIN AVENUE • CLEVELAND 13, OHIO • PROSPECT 1-2751

Chandeysson

GOLDEN JUBILEE 1904 1954

CUTS COSTS OF POWER CONVERSION



14 volt, 10,000 ampere Chandeysson motor generator set as installed at United States Spring & Bumper Company.

IN 23 YEARS "WE HAVE SPENT PRACTICALLY NOTHING FOR MAINTENANCE AND REPAIRS" Says

UNITED STATES SPRING & BUMPER CO., Los Angeles, California

"And," continues Mr. John B. Rauen, President of United States Spring and Bumper Company, "we are still using the first Chandeysson generator we ever bought . . . even though we have given it pretty rough treatment at times. We have 5 Chandeysson generators now, all giving dependable service although we overload them quite heavily at times."

So says another long-satisfied Chandeysson owner . . . proof once again that any way you look at it, any way you figure it, "Chandeysson cuts costs of power conversion." You can expect similar performance from a Chandeysson installation in your plant.
Write, or mail coupon, for full information.

CONVERT WITH *Chandeysson* AND SAVE 4 WAYS

- Use less power
- Get more out of the power you pay for
- Be sure of power when you need it most
- Enjoy lifetime power dividends

Bulletin D-102 contains data and specifications on Chandeysson machines. Your copy sent promptly, and without obligation.

CHANDEYSSON ELECTRIC COMPANY
4078 Bingham Avenue, St. Louis, Missouri

CHANDEYSSON ELECTRIC COMPANY
4078 Bingham Avenue, St. Louis 16, Missouri

Please send me a copy of Bulletin D-102.

Name .....
Company .....
Address .....
City ..... Zone ..... State .....

RESEARCH

FACTS—About the AES RESEARCH PROGRAM

1. Research is vital in any technical field—the Electroplating Industry invests in research for progress and growth, and thereby maintains its competitive position.

2. Eight Research Projects are being carried on by AES and comparable effort in private industry would be up to five times as costly.

3. AES Projects have **practical** value, as well as basic technical value. For example:

   Project No. 2—"Determination of Impurities in Electroplating Solutions," has developed excellent colorimetric analytical methods which can be used in any plating shop by non-technical personnel.

   Project No. 5—"Effect and Removal of Impurities" has developed a practical solution to the problem of removal of some troublesome contaminants.

   Project No. 10—"Disposal of Plating Room Wastes," has produced what is recognized as the most comprehensive review of all the significant work done on this problem.

   Project No. 12—"Cleaning and Preparation of Metals for Electroplating" is developing fundamental data to solve a basic finishing problem, i.e. the production and evaluation of a clean surface.

   Project No. 13—on the subject of "Porosity of Plated Coatings" is seeking a correlation of data developed in Project No. 6 with new techniques in solving a problem recognized even by the layman.

   Project No. 14—"Effect of Basis Metal Condition on Plating" is following a program of study, the results of which will permit two dissimilar finishing operations to work toward a common goal.

   Project No. 15—on the subject of "Accelerated Corrosion Tests" is carrying out an approach in this field, on a scale never before conducted, to correlate conformance tests of plated ware.

4. The AES Research Program is supported entirely by Sustaining Memberships.

Yes, it's a **FACT** that the **AES RESEARCH PROGRAM** is important

—to you
—to your Company
—to the Electroplating Industry

—and that its **progress is outstanding.**

Assist your Branch Research Chairman in his efforts to obtain additional Sustaining Memberships.

• • •

INVEST NOW!!!

"YOUR BEST BET'S THE AES RESEARCH PROGRAM"

Trade Literature

L—500. Bulletin On D-C Electrical Equipment—A complete line of d-c electrical equipment for use in electroplating processes is pictured and described in a new bulletin offered by Hanson-Van Winkle-Munning Co., Matawan, N. J. The line includes generators, rectifiers, PR controllers, tank rheostats and special panels.

An unusual feature of this bulletin is that both generators and rectifiers are covered, and their respective characteristics listed side by side. Both items are completely dependable sources of direct current for electroplating and allied processes. Two pages in this 4-page, 2-color bulletin are devoted to the generators and rectifiers.

Information is given for the generators on standard voltage ratings, special construction of the brushes and holders, design of shunts, type of sleeve bearings and construction of the generator ring. Included in the section on rectifiers is a description of 12 special design features of the H-VW-M rectifier. For your copy of the bulletin, use Reader Service Card.

L—501. Backstand Idler Literature—The "61" Universal backstand idler, a new, low cost, atachment for all types of wall, bench and floor coated abrasive backstand grinding and polishing operations, is announced by the Coated Products Division of The Carborundum Co., Niagara Falls, N. Y.

Designed for heavy-duty production grinding, as well as for intermittent light polishing jobs, which call for frequent setup changes, the new backstand idler permits belts of the same length to be employed with contact wheels of various diameters. Full descriptive details on the unit are contained in a 4-page brochure. For your copy, use Reader Service Card.

L—502. Kelvin Bridge Booklet—The Frederick Gumm Chemical Co., Inc., 538 Forest St., Kearny, N. J., announces that the new edition of their Kelvin Bridge Booklet is now available. This gives construction data, diagrams, etc., for building and operating a Kelvin Bridge Meter for determining surface resistance values for use in connection with aluminum spot welding, etc. For your copy of this literature, use Reader Service Card.

L—503. Bulletin on Plating of Gravure Cylinders—Modern procedures and techniques for electroplating rotogravure cylinders are described in a new bulletin offered by Hanson-Van Winkle-Munning Co., Matawan, N. J. The bulletin, which includes 12 photographs, also describes and illustrates some of the latest developments in gravure plating equipment.

This 2-color, 4-page bulletin, with a 2-page insert, lists step-by-step the cycle for plating gravure cylinders with the Ballard process. It also gives three refinements of that cycle: (1) steel cylinder and base cyanide copper plating, (2) acid copper plating over base cyanide copper and acid copper plate, (3) chromium plating over acid copper plate. For your copy of this bulletin, use Reader Service Card.

L—504. Bulletin on Cleaning Machines—New 8-page bulletin, "Metal Parts Batch Cleaning In Minutes" describing the Magnus Aja-Lif Cleaning Machines, just released by the Equipment Division of the Magnus Chemical Co., Inc., Garwood, N. J., is of interest to all who are seeking modern and economical cleaning methods to reduce cleaning time and costs.

This new bulletin elaborates on the importance of mechanical agitation in parts cleaning and fully describes the outstanding features of the Magnus Aja-Lif Cleaning Machines. You also will find many photographs of Magnus Aja-Lif Machine applications. For your free copy of the bulletin, use Reader Service Card.

L—505. Catalog on Resinous Bonding Cement for Brick and Tile—The Ceilcote Co., 4842 Ridge Rd., Cleveland, Ohio, announces the availability of a new 4-page illustrated catalog entitled "Corobond . . . An Improved Bonding Cement for Brick and Tile." It is packed with

Extra-at no extra cost
We offer product-quality above the industry standard, the interested attention of owner-managers and heads-up local service by as fine a line-up of distributors any manufacturer can have.
If these "extras" appeal to you, we'd like to have a modest order when you're in the market. We are sure you'll appreciate the quality of BFC Chromic Acid and the nice, friendly way we do business.
CAUTION! DANGEROUS!
KEEP CONTAINER CLOSED
100 LB. NET
BFC
Extra High Purity
CHROMIC ACID
TECHNICAL
FLAKE
BETTER FINISHES AND COATINGS, INC., NEWARK 5, N. J.
BETTER FINISHES & COATINGS, INC.
268 Doremus Ave., Newark 5. N. J.
122 East 7th St., Los Angeles 14, Calif.
BFC
PAINTS PLASTICS CHEMICALS

technical as well as general information on this new acidproof, alkaliproof and solventproof synthetic resinous bonding cement which adds years to the life of brick and tile structures.

Of particular interest is the section describing the manner in which Corobond sets. Special additives automatically adjust the speed of initial set to any temperature between 50 and 100° F. In addition to chemicals providing long pot life, Corobond contains a mixture of acid hardeners that work on a delayed reaction principle. While initial hardening is relatively slow, it is fast enough to permit continuous laying-up without extrusion from the bottom courses of the wall. Once started, the final cure proceeds rapidly, and the structure is ready for use within a short time. For your copy of the catalog, use Reader Service Card.

L—506. Fan Engineering Data Book—A wealth of valuable ventilation engineering information is included in "Fan Engineering Data," newly issued by the Hartzell Propeller Fan Company, Piqua, Ohio.

Among the material selected for inclusion in this 16-page brochure are fans laws and formulae, terms and definitions, recommended velocities for exhaust hoods, an air pressure conversion table, and charts covering duct resistance, entrance losses and rectangular equivalents of round ducts.

Other sections discuss fan installation, maintenance and lubrication, explain noise problems, and show the characteristics of various propeller and wheel designs. Copies of the new bulletin may be secured by using Reader Service Card.

L—507. Bulletin on Vanton Plastic Pump—A new bulletin illustrating the Vanton line of "flex-i-liner" plastic pumps has been prepared by Vanton Pump & Equipment Corp., Empire State Building, New York City. These unique pumps, having neither stuffing box, shaft seals, gaskets nor internal valves, are designed specifically to handle highly corrosive fluids and abrasive slurries. The bulletin contains cutaway illustrations, diagrams, applications, operating specifications, performance data and listing of available body block and flex-i-liner materials. For your copy, use Reader Service Card.

L—508. Packaging Booklet—New and improved packaging for everything from acids to tap drills is described in a new booklet published by Bakelite Company, a Division of Union Carbide and Carbon Corporation, Madison Ave., New York 17, N. Y. This "1954 Guide to Improved Packaging with Bakelite Plastics and Resins" contains detailed information on the latest applications of molded and blown plastics, coatings, adhesives, film and rigid sheet materials for both packaging and display.

The booklet presents the wide range of properties of Bakelite polyethylene, phenolic, styrene, C-11, and vinyl plastics and resins. It is illustrated with 48 photographs of actual packaging applications. Copies of this booklet can be obtained by using Reader Service Card.

L—509. Electric Heating Applications Booklet—Principal industrial electric heating applications and methods are described in a new 32-page booklet, "101 Ways To Apply Electric Heat," issued by the Edwin L. Wiegand Co., 7686 Thomas Blvd., Pittsburgh 8P, Pa.

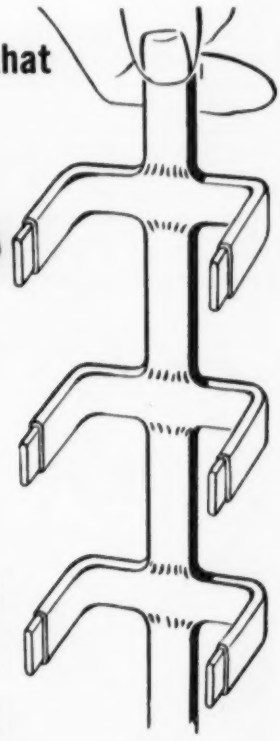
Illustrated case histories show experience-tested ways to apply metal-sheathed electric heating units in myriad industrial jobs. Physical aspects of installation are shown along with a description of the problem, solution and advantages obtained. Some of the heating jobs illustrated could not be done with any fuel except electricity.

The heating jobs illustrated include applications in metal finishing, plastics, chemicals, foundries and electroplating. A section is devoted to far-infrared heating, showing 28 typical uses for this new method. For your copy of this informative booklet, use Reader Service Card.

L—510. Process Control Instruments Catalog—A new catalog (2 color, 20 pages) describing process control instruments has been announced by Fischer & Porter Co., 924 Jacksonville Rd., Hatboro, Pa. The catalog lists a variety of flow meters, recorders, controllers, pressure regulators, sight flow indicators, and chemical feeders. Complete instrument specifications are clearly set forth. Sizing

Be sure of rack protection that

STICKS TIGHT



through all cycles

...use COATING 218X

USERS of Unichrome Coating 218X know that in Unichrome Primer 219PX they're getting the outstanding *single coat primer* developed. It not only saves time and work, but also assures maximum benefits from the remarkable properties of Coating 218X.

Anchored to this primer, Coating 218X takes hard use – even abuse. It defies all plating and cleaning cycles without blistering, or lifting at contacts. It won't crack, chip or tear. It even resists vapor degreasing cycles.

Remember, Coating 218X is produced by United Chromium . . . the company that has: (1) Developed plating processes; (2) Given service on plating problems; (3) Pioneered highly corrosion-resistant plastisol coatings . . . and therefore knows what a rack coating needs for maximum plating service.

UNICHROME Trade Mark COATINGS for METALS

Products of UNITED CHROMIUM, INCORPORATED

100 East 42nd St., New York 17, N.Y. • Detroit 20, Mich. • Waterbury 20, Conn. • Chicago 4, Ill.
Los Angeles 13, Calif. • In Canada: United Chromium Limited, Toronto 1, Ont.

nomographs for the two most common types of Flowrator meters are also given covering both liquid and gas service. For your copy, use Reader Service Card.

L—511. Sodium Sesquisilicate Booklet—Philadelphia Quartz Co., Public Ledger Building, Philadelphia 6, Pa., announces the publication of a booklet which describes in detail the properties and uses of its product, Metso 99, sodium sesquisilicate. It deals with the evaluations of sodium sesquisilicate with respect to the basic detergent properties of wetting, emulsification, dirt suspension and prevention of redeposition. Also included is a demonstration of the product's ability to protect sensitive metals, such as magnesium, copper, zinc and brass when used alone or in conjunction with synthetics and polyphosphates. Popular detergent uses and general directions are tabulated by industry. For a copy of the booklet, use Reader Service Card.

L—512. Revised Teflon Technical Bulletin—A third revision of a DuPont technical bulletin on "Teflon" tetrafluoroethylene resin finishes is now available.

The 12-page bulletin lists 17 successful new "Teflon" applications in addition to those reported in the earlier edition published in March, 1953.

All new uses are derived from the notable release or antisticking property of "Teflon," its high corrosion and heat resistance, as well as its low coefficient of friction.

The booklet discusses various finishing systems of "Teflon" primers and enamels over metallic and nonmetallic surfaces, application methods, the fusing operation, precautions and handling procedures. The bulletin may be obtained by writing DuPont Finishes Division, Wilmington 98, Del., or by using Reader Service Card.

L—513. Brochure Reviews pH Control in Industry—An informative report on the role of automatic *p*H control in industry—to help executives, process engineers and chemists better understand this important technique—has just been released by Beckman Instruments, Inc., South Pasadena, Calif.

The 12-page brochure gives a picture of continuous *p*H recording and control in three major processing areas—water treatment, control of chemical reactions, and waste disposal.

A separate section on chemical reactions explains *p*H control in emulsification, electrolysis, neutralization, hydrolysis, biochemical processing, etc. For your copy of the brochure, use Reader Service Card.

L—514. Heat Transfer Equipment Bulletin—The Industrial Filter & Pump Manufacturing Co., 5900 Ogden Ave., Chicago 50, Ill., has issued a new 8-page bulletin on heat exchangers. Industrial heat transfer equipment is tailored to meet individual performance specifications in the heating or cooling of corrosive or noncorrosive liquids and gases. The bulletin illustrates different types and unit combinations of Industrial heat exchangers. For your copy, use Reader Service Card.

L—515. Tank Linings Booklet—This folder describes the protective linings and coatings that Chase Chemical Corp., 3527 Smallman St., Pittsburgh 1, Pa., applies to protect many types of industrial steel equipment from abrasion and corrosion. For your copy of this booklet, use Reader Service Card.

L—516. Electric Ovens Brochure—For general and analytical laboratories, pilot plant, and production, a new 4-page brochure on electric ovens—gravity and recirculating—Magni-Whirl water baths, and Lab-Heat furnaces has been issued by the Blue M Electric Co., 306-308 W. 69th St., Chicago 21, Ill.

Units range in temperature from 100° to 2000° F. The brochure describes units for chemical, metallurgical, electronic, rubber and similar industrial fields. For your copy, use Reader Service Card.

"Why accept imitations when the original costs no more!"

JOE-D Specialists in SISAL BUFFS!

It took specialized "know-how" to conceive and create the first patented Bias Sisal Buff! And that same knowledge has been steadily enlarged and improved by the ablest, most experienced staff in the business—concentrating on this type of buff. Today, our modern, efficient plant proudly produces buffs that meet the most exacting requirements of the metal finishing industry. Always insist on *original* quality. Specify JOE-D—America's *finest* Bias Sisal Buffs.

Holders of the original patent on Bias Sisal Buffs—U. S. Pat. No. 2642706

The JOE-D line covers a complete selection of Bias, Bias Spoke (Finger), and Conventional Buffs—as well as quality Polishing Wheels.

ATTENTION: JOBBERS! Some choice territories still available. WRITE TODAY!

the JOE-D Buff Company

SANDWICH, ILLINOIS • TELEPHONE 2171

Announcing

MICCROPEEL

STOP-OFF LACQUER

- **Can be peeled off after plating**
- **Will hold hairline demarcation**
- **For use in all plating cycles**
- **Easy to apply**
- **Safe to use**

MICCROPEEL is the new companion product to the already famous Stop-Off materials: MICCROSTOP, MICCROMASK, and MICCROWAX.

Like the others, MICCROPEEL will hold a sharp, accurate line of demarcation in all plating cycles. It will also go through cleaners and hot solutions without losing its superior adhesion on sharp edges.

MICCROPEEL can be peeled off after plating. Parts can be peeled quickly and passed on to the next operation with minimum time and effort expended.

MICCROPEEL will solve your production problems. Write for full information *today!*

MICHIGAN CHROME
and Chemical Company
8615 Grinnell Avenue • Detroit 13, Michigan

miccro Products

Developed and manufactured by experienced platers

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A 529.

Equipment and Supplies

E—517. HVWM To Ship Chemicals in Polyethylene-Lined Drums—Polyethylene-lined drums will be used by Hanson-Van Winkle-Munning Co. for shipping all chemicals packaged at the Matawan plant. Replacing wax-lined and unlined fiber containers, the new drums will

permit customers to store chemical supplies longer without loss of net weight or damage to either product or container.

The lining, which is inert to all products shipped, will prevent deliquescent products from losing moisture during shipment and storage. It also will prevent moisture from damaging hygroscopic products. There will be no change in the drum sizes or in the cost of the packaged product. Drum sizes at present range from 10 to 400 lb. For additional information, use Reader Service Card.

E—518. Pennsalt Cement Mortar for Industrial Construction and Maintenance—Combining for the first time greater chemical resisting properties, superior physical strength and economy with the stability and nontoxic qualities of ordinary furfuryl alcohol type cements, the Corrosion Engineering Products Department of Pennsalt Chemicals announces a new and exclusive all-purpose product under the trade name of new "Pennsalt Furan Cement."

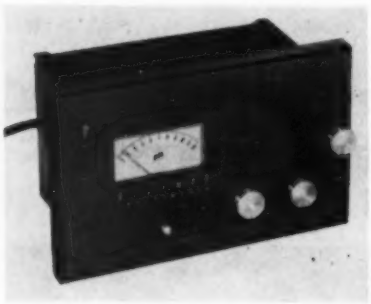
This new furfural-ketone resin development is highly resistant to acids, alkalies, and most solvents. In addition, tests have established the superior physical strength and longer working life and have proven it to be more economical than conventional alcohol types of furan cements.

It is available in two formulations. Powder S, a siliceous filler, is resistant to acids, except hydrofluoric, solvents, oils, grease, water, steam and mild alkalies. Powder C is a carbon type filler, an effective resistant for broad acid and alkali protection including hydrofluoric acid. Both powders are worked easily and may be handled safely. For more information on the product, use Reader Service Card.

E—519. pH Meter Features Quick Servicing, Versatility—A compact, panel-mounted automatic *p*H meter—able to be serviced in minutes by personnel right on the job—has been announced by Beckman Instruments, Inc., South Pasadena, Calif.

It represents the first industrial *p*H meter to accommodate virtually any combination of recorder and meter ranges. Its circuit allows the recorder *p*H scale to be shifted up or down, expanded or compressed. The entire *p*H range or as few as 3 *p*H units can be recorded full-scale on the recorder chart.

Circuits of the new meter are designed in three "plug-in" units, which can be replaced instantly by spares without disturbing panel connections. This feature insures uninterrupted control of *p*H in industrial processes without the need for trained repair specialists.



The meters use the very latest electronic advancements—miniature and subminiature tubes, printed circuits—to make possible accuracies within 0.02 *p*H in output to the recorder. The instrument used regular Beckman glass *p*H electrodes, standard potentiometric recording and controlling equipment, as well as external indication meters. Further information on this industrial *p*H meter can be obtained by using Reader Service Card.

E—520. Product To Stop Pickling Fumes—Cowles Chemical Co., Cleveland, Ohio, announces the addition of a new product, AA compound, to its metal cleaner line.

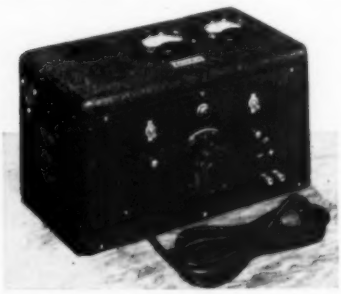
Designed to reduce the hazards and discomforts of pickle rooms, AA compound produces a foam blanket on the surface of the acid bath, smothering the fuming, fogging and spraying action which is very damaging to men and equipment. A white, granular powder, AA compound is dust-free and slightly acid. Added directly to the pickle bath in quantities as small as 3 ounces to each 100 gallons of acid solution, it produces a blanket of foam which is stable and long-lasting. Acid action is not reduced in any way, and faster pickling operations are possible because the foam blanket keeps the heat in the tank, eliminating the loss of heat through fuming. The compound rinses freely and completely. For more data, use Reader Service Card.

E—521. Open-Mesh Abrasive Material—Sand Screen is Carborundum's new nonclogging open-mesh abrasive material, designed especially for sanding operations where loading or glazing in a wide variety of shapes and sizes.

Extensively field tested in the sanding of ferrous and nonferrous metals, wood and paint undercoats and sealers, Sand Screen has been found to give 7 to 15 times longer life than conventional coated abrasives. It is already finding wide acceptance in the automotive and furniture manufacturing industries.

Sand Screen can be used wet or dry, for both machine and hand sanding operations. It comes in full sheets, cut sheets and discs, in grit sizes of 180 and finer. It can be furnished also in standard 50-yard rolls up to 18 inches wide. For more information and a sample of the new material, use Reader Service Card.

E—522. Kocour Selenium Rectifier—The Kocour selenium rectifier model 5B is a self-contained power supply, designed to meet exacting requirements, unusual for its dependable accuracy and

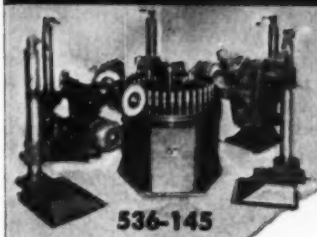


long life. The unit has an a-c input of 115 volts (60 cycles); a d-c output up to 5 amperes at 0–6 volts. Full wave bridge type selenium rectifier stack; powerstat control over entire range from 0 to maximum; smooth d-c output with less than 5 per cent ripple due to choke input filtering are features of this unit. It will fit most low direct current requirements. Write for more data to Kocour Co., 4801 S. St. Louis Ave., Chicago 32, Ill., or use Reader Service Card.

E—523. Stripper for Epoxy Type Enamels—Enthone, Inc., 442 Elm St., New Haven, Conn., has announced the development of a new enamel stripper to remove Epoxy type enamels and most

ACME *Rotary Automatics*

. . . cut costs on production finishing



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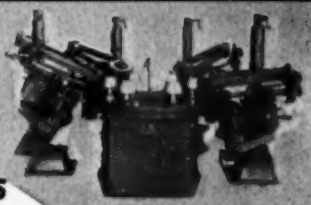


512-9-2

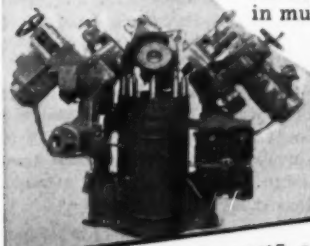
ROTARY TABLES ARE AVAILABLE IN SIZES UP TO 24 FT. DIAMETER

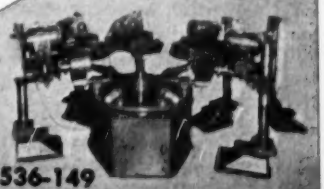
534-337

ACME 8 FT. *Combination Type* ROTARY AUTOMATIC

● This machine can be readily changed from a 32 spindle continuous rotary automatic to an 8 station indexing rotary automatic by simple hand crank adjustment. Various types of ACME adjustable floating head polishing and buffing lathes are used including belt arm attachments on buffing heads, utilizing the same heads for buffing or belt operations. Spindle arrangements are available in multiples of 8.

Rotary Catalog on Request.





536-149

RECOMMENDATIONS and QUOTATIONS . . . will be offered on receipt of blue prints or preferably finished and unfinished parts you contemplate finishing, together with details of your present finishing operations and production requirements.

SPECIAL MACHINERY — AUTOMATIC BUFFING MACHINES

ACME *Manufacturing Co.*

Builders OF AUTOMATIC POLISHING AND BUFFING MACHINES FOR NEARLY HALF A CENTURY

1400 E. 9 MILE RD., DETROIT 20 (Ferndale) MICH.

need a finish
that blocks corrosion by itself—or under paint? specify IRIDITE

You can solve any problem of non-ferrous finishing . . . maximum corrosion protection . . . sparkling clear or colored decorative finishes, firm and lasting base for paint . . . with these two words—"specify Iridite". For example—

- **ON ZINC AND CADMIUM** you can get highly corrosion resistant finishes to meet any military or civilian specifications and ranging in appearance from olive drab through sparkling bright and dyed colors.
- **ON COPPER . . .** Iridite brightens copper, keeps it tarnish-free; also lets you drastically cut the cost of copper-chrome plating by reducing the need for buffing.
- **ON ALUMINUM** Iridite gives you a choice of natural aluminum, a golden yellow or dye colored finishes. No special racks. No high temperatures. No long immersion. Process in bulk.
- **ON MAGNESIUM** Iridite provides a highly protective film in deepening shades of brown. No boiling, elaborate cleaning or long immersions.

AND IRIDITE IS EASY TO APPLY. Goes on at room temperature by dip, brush or spray. No electrolysis. No special equipment. No exhausts. No specially trained operators. Single dip for basic coatings. Double dip for dye colors. The protective Iridite coating is not a superimposed film, cannot flake, chip or peel.

WANT TO KNOW MORE? We'll gladly treat samples or send you complete data. Write direct or call in your Iridite Field Engineer. He's listed under "Plating Supplies" in your classified telephone book.

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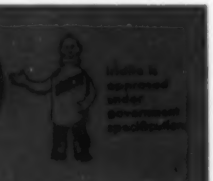

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other enamels. The stripper, S-18, is operated at room temperature. The enamel is removed by a wrinkling action, and the stripper and loosened enamel are removed from the work by means of a water rinse. A water seal is used on the stripper to reduce evaporating losses. The stripper is nonflammable, mild in odor and pleasant to use. It is suitable for removing enamels of this type from brass and other base metals including aluminum and steel. For more data on this product, use Reader Service Card.

E—524. Continuous Metalizing of TV Picture Tubes—Virtually automatic production of the vacuum-metalized coating on the inner surface of television pic-

ture tubes can be achieved with a new self-contained metalizing unit developed by the F. J. Stokes Machine Co., 5500 Tabor Rd., Philadelphia 20, Pa.

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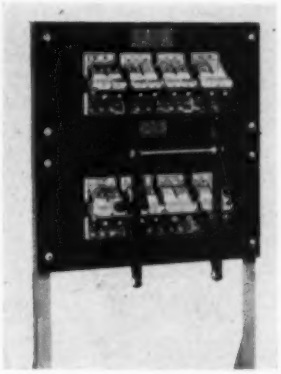
E—525. New Burring Media—The Frederick Gumm Chemical Co., Inc., 538 Forest St., Kearny, N. J., announces the availability of a new burring media called Burr-eens. They consist of a natural abrasive which cuts burring times up to 50 per cent. They do not fracture during operations, and thereby eliminate the main cause of scratching and gouging. In all tests that have been made with competitive materials, Burr-eens have shown

a longer life. Burr-eens are available in 9 sizes, from 00 ($1\frac{1}{2}$-2 inches) to No. 10, which corresponds to 10 mesh. For more information or factory demonstration, use Reader Service Card.

E—526. 3000 Ampere Reversing Switch—A new heavy-duty double-pole, double-throw switch for reversing high currents at low voltage has been announced by Columbia Electric Mfg. Co.,



4519 Hamilton Ave., Cleveland 14, Ohio. It is rated at 3,000 amperes and is the latest addition to an existing line of reversing switches rated at 300, 500, 1,000 and 2,000 amperes for use on direct current up to 15 volts.

This 3,000 ampere cam type switch is designed primarily to reverse the current flowing through a plating tank. When specified it can be furnished for use as a series-parallel switch for double commutator generators. The unit consists of two ebony asbestos panels mounted on angle iron supports, with manually operated handle of sufficient leverage for ease of operating the entire switch mechanism. By placing the handle in a neutral position, the line current can be disconnected. For more information on this product, use Reader Service Card.

E—527. Carry-Over of Chromium Plating Solutions Stopped—The routine treatment of chromium-plated parts usually includes a still, cold rinse directly after plating, followed by a cold running water rinse. After this rinse, many platers use a cold spray rinse, but in almost all shops there is a final hot water soak to provide for self-drying of parts and to act as a security operation to insure complete removal of plating solution.

The trouble experienced by many platers was the carry-over of the solution into this final hot rinse tank, in spite of the many rinsings. Many of them have tried synthetic detergents in order to provide wetting action which would insure better rinsing . . . with varying degrees of success, depending on the detergent used.

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ing the cold running water rinse of the plated parts, they are rinsed in a cold still tank containing the NZ solution, after which they are given a cold spray rinse. The work is now ready for the final hot soak. No further trouble with carry-over has been experienced by any of the shops using Magnus NZ in this manner. For more data on this product, use Reader Service Card.

E—528. New Chlorinator—Wallace & Tiernan, Inc., Belleville, N. J., has announced the A-701 chlorinator, which will be introduced at the American Water Works Association Convention in Seattle on May 23.

First of a series that incorporates the latest developments of practical chlorinator design, the A-701 will feature such improvements as dual orifice meter which automatically, or by the flip of a switch, allows feed ranges up to 100 to 1; corrosion resistant materials wherever good structural design permits; linear scale

reading of chlorine flow rate; and automatic electric, hydraulic, air or vacuum control. Maximum capacity of the A-701 will be 1000 lbs/24 hrs.

Constructed of the most up-to-date materials, and using the best chlorine feed principles developed over a period of years, the new chlorinator employs a heavy Fiberglas pedestal and an improved design of the W&T glass-enclosed visible-vacuum and water-diaphragm principle of feed control. For more information on this unit, use Reader Service Card.

E—529. New Wagner Brothers Plating Rectifiers—A versatile, new line of electroplating rectifiers has recently been developed by Wagner Brothers, Inc., 400 Midland Ave., Detroit 3, Mich., to accommodate any application requiring a positive source of continuously smooth dc power at capacities from 5 to 50,000 amperes.

Five basic models: (1) large package unit, 2,000 to 50,000 amps; (2) water cooled, 1,500 to 50,000 amps; (3) small package unit, 250 to 2,000 amps; (4) cubicle, to 2,000 amps; and (5) bench type, 5 to 200 amps comprise the line.

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E—530. Thermo-Panel Plate Coils—Dean Products, Inc., 616 Franklin Ave., Brooklyn 38, N. Y., announces the formation of the Thermo-Panel Division of the company to market a new plate-type coil which is said to be an improvement on pipe coils for heating and cooling. Thermo-Panel plate coils eliminate the need for expensive pipe coiling. They are simple to clean and are installed easily.

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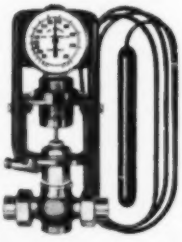

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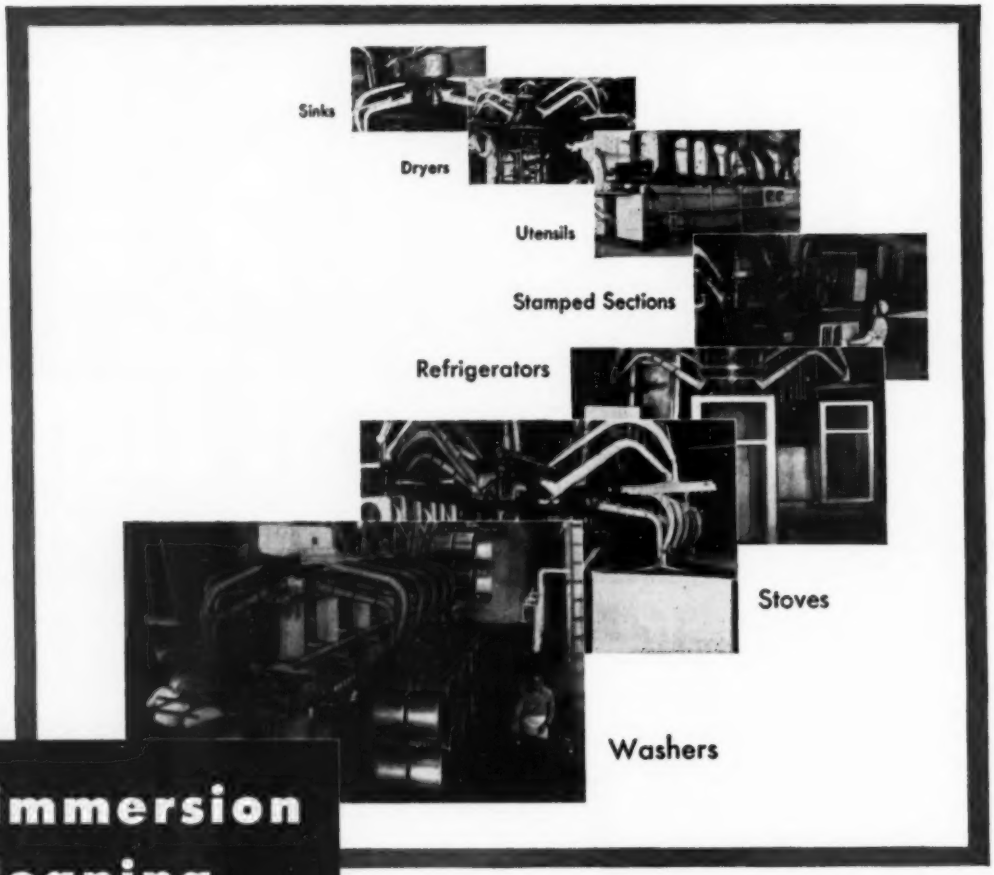

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MAY, 1954 VOL. 41, NO. 5

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Editorial

Why Attend AES Conventions?

. . . This question comes at a time when loyal AES-ers already have made plans to attend the Annual Society Convention in New York City this July. It comes at a time, too, when some members may be questioning whether the expense of going to an AES convention is justifiable. It is mostly to the latter group that these remarks are directed as well as to those employers who are attempting to justify this convention experience as a legitimate company expense item for an employee.

I do not pretend to be an expert in these matters; but, having been exposed repeatedly to the atmosphere of annual meetings of many engineering societies including the AES, I believe that I am somewhat qualified to present the following observations as pertinent:

(1) Information obtained and exchanged in face-to-face contacts in Educational Sessions and at informal get-togethers begets greater take-home payoff than is represented in the official program. Further, actually attending and taking part in a convention is certainly more advantageous than just reading a paper some months after it has been presented at a convention.

(2) Fellow members and their families from all parts of the world come to share the camaraderie and conviviality that an AES convention offers not only through its educational and business sessions, but also through a program of fun and entertainment.

(3) New friendships are made and old ones are renewed. It is not uncommon after one or two conventions to come away with at least a dozen or more first-name friends upon whom you can rely when you need assistance.

(4) Another reason is the opportunity to see and learn firsthand how your Society functions. Important decisions are made which have an effect on each member and Branch as well as on the AES as a whole.

Of course, I can cite many other reasons for attending conventions—how, for example, many major changes of practice in plants and shops have take place years sooner than they would have otherwise as a result of information picked up in a conversation or from a meeting at an AES convention.

Dollar for dollar for value received, you cannot afford to miss an AES convention. As one who knows the advantages, I say it is an investment . . . an investment in the future of your Society, your company and the plating industry.

George P. Swift

President

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ANALYTICAL DETERMINATION OF TRACE CONSTITUENTS IN METAL FINISHING EFFLUENTS

III. THE COLORIMETRIC DETERMINATION OF COPPER IN EFFLUENTS

BY DONALD G. GARDNER,* RALPH F. MURACA,†
AND EARL J. SERFASS†

The following paper, the third of a series, is a result of the work sponsored at Lehigh University by the AES and the Ohio River Valley Water Sanitation Commission. While the original procedure was worked out under AES sponsorship, the modification was developed under ORSANCO sponsorship, the commission having placed the project at Lehigh so as to be able to utilize the background developed by AES Project No. 2. It should be noted that the methods described in this series were tested, modified if necessary, and retested by at least six and sometimes as many as twelve industrial laboratories. As a result of this, the approved form, as published here, was developed.

Abstract

The colorimetric procedure for the determination of the copper content of effluents in the range of 5 to 50 ppm which is described herein was found to yield satisfactory results in the presence of as much as 5000 ppm of each of twenty cations in simultaneous admixture as well as in the presence of organic materials and phosphates.

The sample is treated with hot, concentrated acids to remove organic matter; the copper is extracted by a chloroform solution of mercaptobenzothiazole, changed to the strongly colored orange-yellow complex diethyldithiocarbamate and measured with a colorimeter.

The procedure can be shortened when less than 10 ppm of each metal are present, and a table summarizes the changes which can be made when the amounts of the elements other than copper are known or can be estimated.

The Colorimetric Determination of Copper in Effluents

The two generally used methods for the colorimetric determination of copper depend upon the formation of highly colored complexes with dithizone or sodium diethyldithiocarbamate. Although dithizone is the more sensitive reagent, mercury, silver, iron, and bismuth interfere with the color formation unless special measures are taken. Many heavy metals give colorations with sodium diethyldithiocarbamate; but the most troublesome are nickel, cobalt, and bismuth. The dithizone method is particularly less desirable since many elements in high concentrations will interfere, notably zinc, lead, cadmium, nickel, etc.

It was found that an extraction with mercaptobenzothiazole will separate the copper from the other elements which might interfere with the subsequent color development with sodium diethyldithiocarbamate. The use of mercaptobenzothiazole was first recommended by Spacu and Kuras[1] as a precipitant for copper. Serfass and Levine reported that copper mercaptobenzothiazole could be extracted quantitatively from aqueous solution by amyl acetate,[2] and that the weakly colored extract could serve for the estimation of copper. The color could be intensified by the addition of sodium diethyldithiocarbamate.

Description of the Method

A preliminary fuming with nitric and sulfuric acids is carried out to decompose organic matter that may retain copper in a form which will not react with mer-

*Formerly Research Assistant, Lehigh University; now with U. S. Rubber Company, Passaic, N. J.
†Head and Assistant Professor, respectively, Department of Chemistry, Lehigh University, Bethlehem, Pa.

captobenzothiazole. Any insoluble substances which remain after dilution of the digestion mixture are removed by filtration or centrifugation. The addition of hydrochloric acid to the residue that remains after digestion removes silver as the chloride, while fuming with sulfuric acid precipitates the greater part of the lead.

The diluted digestion mixture then is adjusted to a *p*H of 3.5 to insure the complete extraction of copper by mercaptobenzothiazole. Serfass and Levine[2] found that this *p*H was favorable for the extraction by amyl acetate. When amyl acetate is used, troublesome emulsions are often encountered; the use of chloroform as suggested in this procedure, eliminates this difficulty.

An alcoholic solution of sodium diethyldithiocarbamate is added to the chloroform extract and the developed color is measured at 435 millimicrons on a spectrophotometer or with a blue filter on a colorimeter.

The recommended procedure was found to yield excellent results for concentrations of 5 to 50 ppm of copper in solutions containing 5000 ppm of each of the following ions in simultaneous admixture: Ag^{+}, Pb^{++}, Sn^{++}, Cd^{++}, As^{+++}, Sb^{+++}, Al^{+++}, Cr^{+++}, Fe^{++}, Mn^{++}, Ni^{++}, Co^{++}, Zn^{++}, Ca^{++}, Sr^{++}, Ba^{++}, Mg^{++}, Na^{+}, K^{+}, NH_4^{+}, P as PO_4^{---}, and organic materials such as tartrates. The valence state of the ions in the sample is of no concern because of the action of nitric acid during the fuming step.

It was ascertained that bismuth, mercury, silver and lead were the only metals that formed complexes with mercaptobenzothiazole along with copper under the conditions of the chloroform extraction. Of these metals, silver and lead could be removed easily during the preliminary digestion, but the concentration of mercury and bismuth could not be reduced to the point where they would not interfere. The removal of large quantities of mercury and bismuth would add too many steps to the analysis and since large amounts of mercury and bismuth are seldom encountered in effluents, no steps for their removal are included in the procedure. However, it was found that the recommended procedure gave satisfactory results in the presence of 25 ppm each of mercury and bismuth in simultaneous admixture with the 5000 ppm of each of the elements previously mentioned.

Sensitivity of the Method

The sensitivity of the method is defined as the smallest number of micrograms of copper which can be determined with a relative error of 50 per cent. For the following recommended procedure, this corresponds to 5 ppm or 50 micrograms of copper in the 10-ml sample taken for analysis.

Limit of Detection of the Method

The limit of detection of the method is defined as the number of micrograms of copper which must be present in the 10-ml sample taken for analysis so that an extinction of 0.005 will be obtained in step 15 for a 1-cm cell thickness at 435 millimicrons. This corresponds to 5 micrograms of copper (0.5 ppm).

The limit of detection can be increased by taking a larger sample, provided that the concentrations of mercury and bismuth remain below 25 ppm and the concentration of each of the other elements remains below 5000 ppm.

Discussion of the Blank

A blank is used to compensate for the color due to mercaptobenzothiazole and the traces of copper that are present in the other reagents. Freshly prepared solutions of mercaptobenzothiazole and sodium diethyldithiocarbamate give very low blanks.

Recommended Procedure

This procedure is designed to be used for the determination of 5 to 50 ppm of copper in a 10-ml sample of effluent.

Reagents Required

(1) Nitric acid—Concentrated, 16 N; reagent grade.
(2) Sulfuric acid—36 N; reagent grade.
(3) Hydrochloric acid—Concentrated, 12 N; reagent grade.
(4) Sodium tartrate solution—25 per cent w/v.
(5) Sodium hydroxide solution—20 per cent w/v.
(6) Tartaric acid solution—50 per cent w/v.
(7) Sodium acetate-acetic acid buffer solution—Mix 30 ml of glacial acetic acid with 72 ml of distilled water and add 6 grams of sodium acetate trihydrate.
(8) Mercaptobenzothiazole solution—1 per cent w/v in alcohol. Prepare fresh daily.
(9) Chloroform—Reagent grade.
(10) Sodium diethyldithiocarbamate solution—1 per cent w/v in alcohol. Prepare fresh daily.
(11) Alcohol—Methyl or ethyl; reagent grade.
(12) Standard copper solution—Dissolve 0.050 gram of electrolytic copper in 12 ml of 1:1 nitric acid and dilute to one liter.
1 ml = 50 micrograms of copper.
For establishing a calibration curve, 1 ml of this solution taken as a sample corresponds to 5 ppm of copper for a 10-ml sample of effluent taken for analysis in step 1 of the procedure.

Procedure

(1) Pipette a 10-ml sample of the effluent into a 150-ml beaker.
In running a blank, use 10 ml of water.
In establishing a calibration curve, use 10 ml of water and add 1 ml of the standard copper solution for each 5 ppm of copper.
(2) Add 10 ml of concentrated nitric acid and 10 ml of concentrated sulfuric acid. Evaporate to heavy fumes of sulfur trioxide.

Add 5 ml of concentrated nitric acid and again bring to fumes of sulfur trioxide. Gently fume for five minutes. Do not allow the solution to go to dryness. Add sulfuric acid if necessary.
If the residue after fuming is discolored by organic carbon, cautiously add 5-ml portions of nitric acid and fume again. Repeat as many times as is necessary.

(3) Cool to room temperature. Add 50 ml of water and 1 ml of concentrated hydrochloric acid. Stir and let stand for one or two minutes. (Important)

(4) Filter the solution, if necessary, through a medium porosity sintered glass funnel, saving the filtrate. If possible, use a centrifuge.
Wash the filter at least three times with 5-ml portions of water. Combine the washings and filtrate.

(5) Transfer the filtrate and washings to a 100-ml volumetric flask and dilute to the mark with water.

(6) Transfer 20 ml of the solution to a 150-ml beaker.
Add 15 ml of 25 per cent sodium tartrate solution. Stir well.

(7) Adjust the *p*H of the solution to 3.5 by means of the addition of 20 per cent sodium hydroxide solution or 50 per cent tartaric acid solution.

(8) Quantitatively transfer this solution to a separatory funnel using a minimum of water.
Add 10 ml of sodium acetate-acetic acid buffer. Mix well.

(9) Add 5 ml of 1 per cent mercaptobenzothiazole solution. Shake well for two minutes and let stand for 5 minutes with an occasional swirling.

(10) Extract the solution with two separate portions of 5 ml of chloroform, each time shaking well for at least one minute. Save the chloroform layer.

(11) Wash the chloroform with two separate 5-ml portions of water. Shake very well. Discard the washings.

(12) Transfer the washed chloroform layer to a clean separatory funnel that has been rinsed thoroughly with alcohol (no water). Add 1 ml of 1 per cent sodium diethyldithiocarbamate solution. Shake well.

(13) Transfer the solution to a 25-ml volumetric flask; rinse the separatory funnel with a 5-ml portion of alcohol and add this to the volumetric flask. Dilute to the mark with alcohol. Mix very well.

(14) Set the Klett-Summerson colorimeter to zero with a solution of 3 volumes of alcohol and 2 volumes of chloroform. Use a blue filter (No. 42). With a spectrophotometer, set the instrument to read full scale at 435 millimicrons.

(15) Transfer the solution from step 13 to the sample cuvette and read the colorimeter.

TABLE I. SUMMARY OF CHANGES OF RECOMMENDED PROCEDURE WHEN SAMPLE COMPOSITION IS KNOWN

Composition of Effluent	Changes in the Recommended Procedure
Organic matter absent	Omit steps 1 to 5 inclusive. Use a 10-ml sample of effluent, add 1 ml of concentrated sulfuric acid and 1 ml of concentrated HCl. Dilute to about 50 ml and transfer to a 100-ml volumetric flask. Start with step 6 of the recommended procedure.
Organic matter, lead, and silver absent	Omit steps 1 to 5 inclusive. Take a 10-ml sample, dilute to 100 ml in a volumetric flask, and start with step 6 in the recommended procedure.
Organic matter absent; all other elements, below 10 ppm; *p*H 2.0–8.0	Omit steps 1 to 8 inclusive. Take a 20-ml sample of effluent and transfer to a separatory funnel. Add 10 ml of sodium acetate-acetic acid buffer and start with step 9 of the recommended procedure.
Organic matter present, mercury and bismuth less than 25 ppm	Follow the recommended procedure.

(16) If necessary, convert the scale readings of the photometer to optical density. Subtract the blank reading from the sample reading. If a calibration curve is being established, plot these corrected readings vs. ppm of copper. If a sample is being run, read the amount of copper present from the calibration curve.

TABLE II. SHORTENED PROCEDURE FOR COPPER IN THE RANGE 0.01 TO 5 PPM

Composition of Effluent	Shortened Procedures
Copper 0.01 to 0.1 ppm	Use 200 ml in step 1. Omit step 5, add 15 ml of 25 per cent sodium tartrate solution and then proceed with step 7. In step 15, use a 5-cm cuvette.
Copper 0.1 ppm to 1 ppm	Use 25 ml in step 1. Follow the above directions.
Copper 1 ppm to 5 ppm	Use 50 ml in step 1. Follow the recommended procedure.

Note: The use of burettes for accurately dispensing volumes of reagents starting at step 9 will aid considerably in eliminating error in color densities.

Variations of the Recommended Procedure

If the composition of the effluent is known, the recommended procedure can be altered to suit particular samples. In general, the procedures will be shortened materially if the concentration of each element, other than copper, is less than 10 ppm.

Table I summarizes the changes that can be made in the recommended procedure when the composition of the sample is known. Unless otherwise stated, the concentrations of other elements must not exceed 5000 ppm each except for mercury and bismuth which are not to exceed 25 ppm each. For effluents containing mercury and bismuth in greater quantities, the sample should be diluted.

A Shortened Procedure for Copper in the Range 0.01 to 5 ppm

The procedures in Table II have been designed for the analysis of effluents which contain small amounts of copper and also small amounts of other interfering elements.

For the procedures indicated in Table II, the lead and silver content should be under 0.1 ppm each. Also, mercury and bismuth should be under 0.05 ppm.

REFERENCES

[1]G. Spacu and M. Kuras, Z. Anal. Chem. **102**, 24 (1935).
[2]E. J. Serfass and W. S. Levine, Monthly Rev., Am. Electroplaters' Soc., **34**, 454 (1947).

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NICKEL PLATING TROUBLES AND CURES

O. A. STOCKER,* A. KORBELAK† AND S. A. CARRANO‡

The troubles that may beset a plating foreman are many and varied, and the possible causes and probable cures now fill many a page in reference books.

It is far better to avoid the troubles, by close control, than to have to cure them. The Chinese thought it expedient to pay a doctor to keep them well, which pay was withheld when illness occurred.

The analogy with plating may not be too obvious, but, logically, control of plating operations by a trained foreman or a laboratory staff affords insurance against troubles that may cause costly rejects or shutdowns.

The following chart, based on the authors' experiences with several hundred installations, covers only nickel plating trouble shooting in a general sense. For more complete and explicit information, the literature already published should be consulted.

NICKEL PLATING TROUBLE SHOOTING CHART

Possible Source of Trouble	Suggested Cure	Possible Source of Trouble	Suggested Cure
1. LACK OF ADHESION (PEELING)			
(a) Cleaning Cycle	Cleaners should be tested for concentration, temperature, current density, chromic acid or other contamination. When hexavalent chromium is found, it may be overcome by treatment with sodium hyposulfite ($Na_2S_2O_4$), as outlined by M. M. Beckwith.§ Water rinses should be checked for cleanliness.	(d) Repair work	Repair work should be stripped clean before it is replated, or the old nickel surface must be activated. Activation of the work is accomplished in either of two ways. In a cyanide activator, the work is made cathodic for 30 to 60 seconds at 70–80° F in a 12-ounce-per-gallon solution of sodium cyanide. At least 6 volts are needed to produce vigorous gassing on the work being activated. Some workers prefer to precede the cathodic treatment with an anodic shot of a few seconds. Activation also is carried out in the Wood chloride-strike bath.
(b) Lack of acid dip	A proper concentration acid dip and water rinse should be used as final steps before the work is plated.		
(c) Current interrupted	Breaking of current should be avoided, as the laminated deposit may not be adherent, especially when the plated ware is bent.		

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§M. M. Beckwith, Proc. Am. Electroplaters' Soc. **29**, 80–86 (1941).

NICKEL PLATING TROUBLE SHOOTING CHART (*Continued*)

Possible Source of Trouble	Suggested Cure
1. LACK OF ADHESION (PEELING)	
(e) Overcleaning	Surface of the work should be checked after cleaning for films or stains from an overconcentration cleaner. Excessive current density, especially in anodic cleaning, should be avoided.
(f) Undercleaning	Water breaks from a below-concentration cleaner indicate undercleaning. Current density may be too low.
(g) Improper acid dipping	Inspection should be made for stains or films from an overconcentration acid dip, or lack of neutralization from an underconcentration acid dip. Muriatic (hydrochloric) acid may be more suitable than sulfuric, or vice versa, for the job.
(h) Impurities	The plating bath should be tested for impurities such as lead, chromium, or foreign organics. Metallics such as lead are removed by dummy plating. Chromium is removed by a high *p*H treatment and sometimes with the additional use of potassium permanganate and lead carbonate.* Organics are removed by carbon treatment, either with or without previous oxidation with potassium permanganate, hydrogen peroxide or sodium hypochlorite, as indicated by tests.
(i) Passive base metal	Alloys, such as stainless steel, heat-treated steel and nickel alloys, may have to be activated by use of the Wood strike or by electrolytic acid treatment.
(j) Porosity of base metal	Thorough rinsing is required to remove entrapped cleaner, acid, etc.

*W. A. Wesley and W. H. Prine, "Practical Nickel Plating," p30, International Nickel Co., N. Y. (1952)

Possible Source of Trouble	Suggested Cure
2. DEPOSIT LACKS DUCTILITY	
(a) *p*H too low	The *p*H should be tested and adjusted with nickel carbonate. Ammonia or alkali carbonates never should be used in bright nickels for this adjustment.
(b) Excess peroxide	Where hydrogen peroxide is being used as an antipit in dull nickel baths, excesses should be avoided. When an accidental excess occurs, it is removed by heating of the bath. Hydrogen peroxide in excess may cause pitting or may result in a deposit that is passive to chromium plate; also the ductility of the deposit may be impaired.
(c) Low boric acid	Boric acid may be very much below normal; analysis will indicate the additions that are required.
(d) Organic contamination	Organic impurities should be checked and removed. The effect of organic impurities should be determined by use of Hull Cell tests. They are removed by carbon treatment, with or without preliminary oxidation, as tests may indicate, and, as detailed in the section on impurities (1h).
(e) Excess brighteners	Lack of ductility in bright nickel baths results from brighteners, especially booster type, being in excess. The amount of excess should be determined and then reduced in concentration to the proper level. Booster brighteners are those that give the greatest brightness, are required more frequently as additions to a bath and normally are present in a small optimum concentration as compared to the other additions.

NICKEL PLATING TROUBLE SHOOTING CHART (*Continued*)

Possible Source of Trouble	Suggested Cure
3. DEPOSIT IS DULL (BRIGHT NICKEL BATHS)	
(a) *p*H out of range	The *p*H should be adjusted to an optimum value.
(b) Booster brightener low	Analysis for this material indicates the addition that is required.
(c) Temperature out of range	The temperature should be kept within range.
(d) Brightener additions out of balance	Where two or more addition agents are used, the proper proportions must be present. Adjustments should be made to the correct values.
(e) Organic impurities	The bath should be tested with a Hull Cell for the presence of organic impurities from rack coating, tank linings, or buffing compounds. When found, they are removed by carbon treatment, with or without preliminary oxidation, as tests may indicate and as outlined in the section on impurities (1h) above.
(f) Metallic impurities	The bath should be analyzed for presence of copper, zinc, lead and cadmium. These impurities are removed by dummy plating, precipitation-filtration or both.
(g) Drag-in contamination	The bath should be checked for contaminating drag-in from cleaners, acid dips, dirty rinses, etc., by cracked or loose rack coatings, or by improper rinsing of recessed work. The source of trouble should be eliminated.
4. DEPOSIT IS DARK	
(a) Impurities	Excessive amounts of copper, zinc, lead or cadmium may be present. They are removed by dummy plating.
(b) Concentrations off	A dull nickel bath may plate dark when used diluted and at higher current densities. The bath should be analyzed to test for this condition, and it should be adjusted then to proper concentration.
(c) *p*H too high	A dull nickel bath will plate dark at a high *p*H where basic nickel salts will plate out. Adjustment of *p*H to proper level corrects the difficulty.
5. STREAKY DEPOSITS	
(a) Concentrations not normal	The solution should be tested for low concentration of nickel, chloride and boric acid and adjusted to the correct values.
(b) Gassing due to dirt in crevices or holes	Adhering buffing compounds and dirt can cause this trouble and should be eliminated.
(c) Contamination present	Cleaner or cyanide may be retained in holes or crevices through improper rinsing. Steps should be taken to eliminate such a condition if they are found.
(d) Foreign material suspended in bath	Filtration of the bath and an investigation into the source of suspended material with its removal should cure this problem. Horizontal streaks may be due to gelatinous material adhering to surface during the deposition of the coating.
(e) Localized low *p*H	Acid may be retained in holes or crevices due to improper rinsing. Thorough rinses will help to avoid this condition.
(f) After additions of brightener	Bath should be thoroughly mixed.
(g) Hydrogen pitting	Vertical streaks may be caused by hydrogen gassing. Agitation, redesign of racks and other steps may be taken to correct this.

NICKEL PLATING TROUBLE SHOOTING CHART (*Continued*)

Possible Source of Trouble	Suggested Cure
6. SPOTTY DEPOSITS	
(a) At bottom of work	The bath should be stirred well or agitated to avoid stratification and nonuniform temperature layers or both.
(b) Foreign solid material in bath	Filtration of the bath eliminates this source of contamination. Calcium sulfate is less soluble in a hot bath than in a cold one and may precipitate out to cause roughness.
(c) Poor rinsing	Cleaners not thoroughly rinsed off, or not neutralized by acid dip, or silicates precipitated on the work will cause spotty deposits. Thorough rinses are advised.
(d) Undissolved boric acid	Heating bath to redissolve boric acid, which crystallizes when bath gets too cold, is suggested.
7. DEPOSIT DARK IN RECESSES	
(a) Metallics in bath	The bath should be tested for contamination by copper, zinc, cadmium, and lead. If found, they are removed by dummy plating.
(b) Organic impurities	Hull Cell tests indicate these impurities. They are removed, if found present, by carbon treatment, as outlined in section (1h) above.
(c) Low current density	Increases of current density as high as possible without burning of the work is advised.
8. POOR THROWING POWER AND POOR COVERAGE	
(a) Metal content low	Analysis for nickel concentration and increases to the proper level are recommended.
(b) Conductivity poor	A check of chloride content and an increase to the proper level is indicated.
(c) Current density low	An increase in current, as high as possible without burning of the work is advised.
(d) Impurities present	The bath should be tested for metallic impurities, copper, zinc, cadmium and lead, and organic impurities. These are removed, if found present, by dummying to eliminate the metals and by carbon treatment to remove organics as outlined in (1h) above.
(e) Loose contacts	A check of all electrical connections to tank, rack, and anodes is advised. Cleanliness to insure full flow of current is a must.
(f) Anodes	An inspection of anodes for number, spacing and area is suggested. Normally 2–3 anodes per foot of anode bar are sufficient.
9. BURNT EDGES OR FROSTY PLATE	
(a) Excessive current density	A reduction of current or an increase of agitation and a higher temperature are in order. Work should not be too close to the anodes.
(b) Bath concentrations low	The operator is instructed to analyze and build up the bath to standard values.
(c) Ammonium salts present (high current density baths)	Ammonium salts limit maximum current density and never should be added, as they can only be reduced by drag-out.
(d) Excess brighteners	Excess brighteners may limit maximum current density. Brighteners should be kept within proper limits.

NICKEL PLATING TROUBLE SHOOTING CHART (*Continued*)

Possible Source of Trouble	Suggested Cure
9. BURNT EDGES OR FROSTY PLATE	
(e) Chemical contamination: Presence of aluminum and iron causes frosty deposits at high current densities	A test for chromates or nitrates is advised. Chromium is removed by high pH method* and nitrates are reduced by dummy plating at 50–60 amperes per square foot, at a *p*H of 2–3 electrometric. Aluminum and iron are removed by high *p*H treatment.
(f) Organic contamination	Hull Cell tests and removal of the contamination, as (1h) above, are in order.
(g) Excess iron in bath	Analysis for iron in the solution should be made. It is removed by raising of the *p*H and followed up with filtration of the solution.
10. PITTING	
(a) Antipit agent off concentration	If wetting agent is used, pitting may occur if concentration is too low, but also if too high. The operator is cautioned to avoid excesses if possible.
(b) Antipit agent	If hydrogen peroxide is being used in a cold bath, concentration may be too low. If organic antipit is being used, the concentration may be low.
(c) Organic contamination	Organic contaminants may cause pitting and are removed with activated carbon as outlined in (1h) above.
(d) Rough deposit pits	Foreign solid material—such as precipitated iron, dirt and carbon—are removed by filtration.
(e) If *p*H and concentrations are normal and bath is clean	Tests should be made for air being introduced by the filter, or by the addition of cold water while plating is being performed. Also a check for lost work dissolving in the bath is advised.
(f) Gassing while plating	Zinc base metal, not completely covered with copper, will dissolve and release hydrogen and contaminate the bath.
(g) Low *p*H	Too low a *p*H will attack zinc base metal through a thin copper plate. Adjustment to best operating level is urged.
(h) Low temperature	Adjustment of temperature to optimum range is necessary.
(i) Low boric acid	Analysis for boric acid, and a build up to proper concentration are indicated.
(j) Current excessive	Lowered current, or increased agitation, and raised temperature are suggested.
(k) When heating up bath	A cold bath, especially if not used for some time, will have absorbed air which will pass off after the bath is heated.
(l) After raising *p*H	Carbon dioxide, produced when the *p*H is raised with nickel carbonate, is removed by heating of the bath.
NOTE: Hydrogen pits are characterized by a bright pit with a vertical tail. Gas pits from air or carbon dioxide are characterized by very fine pits with no tails. Rough deposits are sometimes confused with pitting.	
11. ROUGH DEPOSITS	
(a) High current density	Adjustment of the current density is required, as excessively high current may cause codeposition of minute solid particles that are suspended in bath. Each bath has a limiting maximum current density.
(b) Low bath concentration	Too low a concentration of nickel, chloride, and boric acid will promote rough deposits. Analysis of the bath and adjustments to proper concentration are in order.

* W. A. Wesley and W. H. Prine, "Practical Nickel Plating," p30, International Nickel Co., N. Y. (1952)

Possible Source of Trouble	Suggested Cure	Possible Source of Trouble	Suggested Cure
	11. ROUGH DEPOSITS		
(c) Low temperature	Very low temperature, below about 60° F, depending on current density will cause roughness. The bath temperature should be adjusted to a practical value.	(e) Iron and aluminum contamination	An excess of dissolved iron and aluminum will promote precipitation under electrolysis at the high *p*H's. The impurities are removed by high *p*H precipitation plus filtration.
(d) High *p*H	A *p*H above 5.0 electrometric may promote inclusion of basic nickel salts in the deposit, depending on current density. An adjustment of the *p*H to a proper level is advised.	(f) Solids in bath	Filtration of the bath is recommended. Operators are cautioned to avoid the presence of anode sludge, dirt, buffing compounds, filter-aids, activated carbon in the solution.

THE METAL PLATER*

O, I've seen some ornery hombres
In this blooming vale o' tears
That had the guts of horses
And steel between their ears.

I've seen some rough, tough bimbos
Since my span of years began
But I've never seen another
Like the Metal Plating Man.

He's spawn of witch's cauldron
He's rustproof through and through
He's the epitome of hardness
From his constant acid brew.

He has copper sheathed internals, a nickel plated hide
And his skull is lined with extra luster chrome.
He's a double dipped conniver when he's at his daily chore
And you'll find he's just as tough when he's at home.

He bathes in hydrochloric and he breathes pure sulfuric fumes
And he loves the smell of phosphor in his stew.
They don't make drinking liquor strong enough to suit his taste
So he dribbles nitric acid in his brew.

It takes ten thousand electro amps
Just to spread his bread and jam.
He's a throwback to the elements
The METAL PLATING MAN.

*Submitted by Jim Campbell, Boston Branch, AES

RADIOMETRIC STUDY OF THE CHROMIUM-SULFATE COMPLEX FORMED IN CHROMIUM PLATING BATHS*†

RONALD L. SASS‡ AND STANLEY L. EISLER‡

Abstract

Tests conducted to determine the ionic nature of the coordination complex formed and the amount of sulfate so complexed are described. It was found that the chromium-sulfate complex formed is cationic in behavior and can be removed from the plating solution by employing the appropriate ion exchange media. Approximately seven per cent of the total sulfate is bound up in the complex after electrolysis. The formation of a large complex ion is indicated by the fact that the per cent of sulfate regained from the resin column is considerably less than and independent of the amount of trivalent chromium regained.

Introduction

Erich Müller,[1] a German investigator, has stated that current-voltage curves of the purest chromic acid solutions using gold electrodes show that the chromic acid present cannot be reduced electrolytically either to trivalent chromium or chromium metal. This condition is changed by the addition of sulfuric acid, when both trivalent chromium and chromium metal are formed at different potentials. Although methods of chromium electrodeposition are being developed using baths of trivalent chromium, chromic acid baths are still used almost exclusively by industry. Therefore, the sulfate ion remains an important part of chromium plating.

The recognition of the need of a complex forming radical in chromium plating is not new. Perhaps Robert Bunsen had some idea of the necessity of complex ions when he became the first person to plate chromium successfully in the year 1854. It was, however, in 1924, seventy years after Bunsen's experiment, that a commercial method of chromium plating was developed. In that year Fink submitted to the United States Patent Office his process for converting laboratory plating practices into a commercially feasible process.[2]

At first the sulfate ion was added to the bath as $Cr_2(SO_4)_3$ and the trivalent chromium was mistakenly considered as the important constituent. Later, by the use of sulfuric acid, it was found that the sulfate ion was the important factor. By trial and error, platers have since found the proper sulfate concentration. They noticed that too small an amount of sulfate resulted in either no plate or brown stains, and too high an amount resulted in partial plating or none at all.[3]

Interest in the function of the sulfate ion was recently stimulated at this laboratory when a large cationic resin exchange column was installed in the plating shop of this Arsenal. The purpose of this column was to regenerate the chromic acid plating solutions. It is well known that used plating solutions contain dissolved metals such as copper, iron and aluminum.

These metals in sufficient quantity render the solution inefficient by decreasing the conductivity of the bath. If they are not removed, the plating baths must be discarded. To prevent huge material waste and to minimize waste disposal problems, the impure chromic acid may be reclaimed by passing it through a cationic resin exchange column.

In the eleven months that such a column has been in use at this Arsenal, not only have the metal impurities successfully been removed, but also a considerable amount of sulfate ion has been lost. This fact indicates that some sulfate is in solution as a complex ion. The object of this investigation is to reveal the nature and amount of this complex and to apply the results obtained to explain the function of this ion in the plating process. Radioisotopic techniques were employed because the concentrations of sulfate encountered were

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*The opinions or assertions contained herein are not to be construed as being official or reflecting the views of the Department of the Army.

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‡Chemist and Supervisor of Radiochemistry Section, respectively, Ordnance Corps, Rock Island Arsenal, Rock Island, Ill.

considered too small to analyze accurately by ordinary gravimetric methods.

Preparation of Solutions

The solutions used in this work were formulated to obtain a chromic acid-sulfate ratio of 100:1 and a chromic acid concentration of approximately 250 grams per liter. These concentrations resulted in solutions which were of the same strength as commercial plating baths. The volume used for each test was 1500 ml. Radiosulfur was added to each volume of solution in the form of sulfuric acid. This radioisotope was purchased for this investigation from the Oak Ridge National Laboratory by authorization of the Atomic Energy Commission, Isotope Division. It was received as sulfuric acid and was diluted to yield a stock radiosulfur solution having an activity of 200 microcuries per milliliter. The portion of the stock radiosulfur solution used in this investigation was of an amount calculated to give an activity of 0.1 microcurie per milliliter of chromic acid solution. A 250-ml portion of the chromic acid solution was then retained for testing purposes. This solution will hereafter be referred to as the starting solution.

The remaining 1250 ml of the starting solution was electrolyzed at room temperature for six hours at five amperes current. This current gave a cathode current density of 20 amperes per square foot and an anode current density of 150 amperes per square foot with the lead electrodes used. Seegmiller and Lamb[4] stated that this high ratio of anode to cathode current density is conducive to the formation of trivalent chromium. To compensate for loss due to evaporation during electrolysis, deionized water was added to the solution to return it to the original volume. A portion of the electrolyzed solution equivalent to that taken from the starting solution was set aside for analysis. Results of analyses made, placed the concentration of trivalent chromium at 6 to 12 gram per liter as shown in Table II.

Removal and Recovery of Complex

The electrolyzed solution was considered to be equivalent to an actual plating bath which had been in use for a considerable length of time. It was then necessary to prove the presence of the chromium sulfate complex. In order to separate the complex from the remaining sulfate, a method had to be employed which would not cause its dissociation. Tests were conducted on the electrolyzed solution to determine if barium chloride would precipitate the complex-bound sulfate as well as the free sulfate radical. Results of these tests showed that complete precipitation of the total sulfate was effected. For this reason ordinary methods of precipitation were abandoned as a basis for separating the complex. The problem of separating the complex without destroying its ionic structure was solved by the use of a resin ion exchange column. Two forms of resin could have been employed, either a cationic or an anionic exchanger. If one were to assume the complex to be cationic in nature, a simple separation of the sulfate bound in the complex and the anionic free sulfate could be executed by using a cationic resin and employing radiosulfur (S^{35}) as a tracer. Since a cationic exchange resin was on hand, this material was tried first. The results obtained by using this method showed the formation of cationically bound sulfate. Therefore, the use of an anionic resin was abandoned. If the complex had proved to be anionic, another method would have been employed using radiochromium as a tracer.

The resin column used in this investigation consisted of a 500-milliliter glass delivery burette, one and one-half inches in diameter. The column was packed with 500 cubic centimeters of cationic resin.* A fresh volume of resin was used for each of the six test runs. A flow valve was connected to the lower end of the column to permit a flow rate of 60–70 milliliters per minute.

Since the resin was received as the sodium salt, it had to be regenerated with hydrochloric acid. The manufacturer recommends for the purpose of regenerating a 10 per cent solution of sulfuric acid which is equivalent to 104 grams of hydrochloric acid for the volume of resin used for these tests. In this investigation, five different acid treatments were used for regeneration to avoid experimental error due to insufficient regeneration. All of these acid solutions contained amounts of acid greater than the theoretical amount necessary to charge the column. The amounts of acid used varied from 150 grams to 875 grams of HCl in either 10 per cent or 20 per cent deionized water solutions. The column after regeneration was flushed with deionized water until chloride free.

The electrolyzed solution was diluted 1:1 with deionized water prior to introduction into the resin column. This was done because the high concentration of chromic acid in the undiluted electrolyzed solution would decompose the resin molecules. The column was washed subsequently with deionized water until free of the color of the dichromate ion. The effluent and washings were combined and diluted to a volume in definite ratio to the electrolyzed solution.

Several different methods were used to recover those cations adsorbed in the resin column. These methods involved agitating the resin in a beaker with varying portions of hydrochloric acid, pouring the acid through the column of resin, and combinations of the two. The amounts of acid used for recovery purposes varied from 200 to 1000 grams of HCl in both 10 per cent and 20 per cent solutions. All methods proved that the cationic sulfate was bound more tightly to the resin than the free trivalent chromium. Although different methods of recovery resulted in varying amounts

*Amberlite IR-120, Rohm & Haas Co., Philadelphia, Pa.

TABLE I. ANALYSIS OF SOLUTIONS—SULFATE CONCENTRATION (g/l)

A Run Number	B Starting Solution	C Electrolyzed Solution	D Decationized Solution	E Column C minus Column D	F Sulfate Retention Per Cent	G Regenerate Solution
1	2.898	2.898	2.756	0.142	4.9	0.157
2	2.898	2.876	2.718	0.158	5.5	0.015
3	2.831	2.831	2.733	0.098	3.46	0.022
4	3.198	3.198	2.898	0.300	9.4	0.097
5	2.808	2.771	2.479	0.292	10.5	0.150
6	2.674	2.636	2.509	0.127	4.8	0.037
Average	2.884	2.868	2.682	0.186	6.9	0.080

of sulfate and trivalent chromium recovery, no definite relationship could be set up between ion recovery and method of regeneration.

Methods of Analysis

Trivalent chromium analyses were made on all solutions with the exception of those for test run number four. The method used for the determination of trivalent chromium was developed at this laboratory using a modification of the method of Willard and Young[5] in order that the titrations could be made electrometrically on an automatic recording titrometer.*

A radiometric method for determining small percentages of substances is given by Friedlander and Kennedy.[6] This method has been adopted and modified by this laboratory for the determination of sulfate concentration in chromic acid baths and is described as the radioactive isotope dilution method.[7] Briefly, this method involved adding to a solution containing an unknown quantity of a substance, a known amount of the same substance which is radioactively tagged. Then the specific activity (activity per unit weight) of the pure compound isolated from the solution is compared with that of the added substance. The amount of unknown material present is given by the formula:

$$W = \left(\frac{Sa}{Sb} - 1\right) Wa$$

Where W = Weight of the unknown
Wa = Weight of known added
Sa = Specific activity of known added
Sb = Specific activity of mixture

Because of the extremely low concentration of the isolated complex in the regenerating acid solution, it was considered advantageous to use a revision of this method as given by Calvin.[8] He stated that if only a small amount of substance is present in a sample, the ratio of nonactive substance to active substance could be increased to better proportions if the active substance were placed directly in solution as the unknown instead of as the diluent. In this case the dilution is made with a known quantity of nonradioactive material. This modification, called the reverse isotope dilution method, was used for the sulfate determination of the various solutions. A brief outline of the method[9] as formulated for this problem is as follows:

1. Three ml of the test solution were pipetted into a 250-milliliter beaker.
2. Then 7.5 ml of 0.1 Normal H_2SO_4 were added.
3. Then 50 ml H_2O, 10 ml concentrated HCl, 15 ml CH_3COOH, and 20 ml C_2H_5OH were added.
4. The sample was placed on a hot plate and boiled for 15 minutes.
5. While the solution is still hot 15 ml of 10 per cent $BaCl_2$ were added.
6. The sample was allowed to stand in a warm location for two hours.
7. Each sample was filtered using a 1-1/8 inch disc of S & S No. 597 filter paper mounted on a special suction apparatus.
8. The filter paper disc was mounted on a suitable aluminum disc support, dried under an infrared lamp and counted.
9. A control sample was prepared using 15 ml of the starting solution in a 250-ml beaker. Then steps 3 through 8 were followed.

The counting was done using a unit† employing a TGC-2 neon filled Geiger Müller tube with a mica window thickness of 1.7 mg/sq cm. The samples were centered on an aluminum plate placed on the first shelf of a Lucite mount so that the surface of the samples was ten millimeters from the tube window. The entire assembly was mounted in a vertical lead shield with 1½ inches of lead shielding.

*Manufactured by the Precision Scientific Co., Chicago 47, Ill.
†Model 163 Scaler, Nuclear Instrument and Chemical Corporation, 225 W. Erie Street, Chicago, Ill.

TABLE II. ANALYSIS OF SOLUTIONS—TRIVALENT CHROMIUM CONCENTRATION (g/l)

A Run Number	B Starting Solution	C Electrolyzed Solution	D Decationized Solution	E Column C minus Column D	F Regenerate Solution
1	0.367	6.830	0.187	6.643	4.059
2	0.367	7.144	0.554	6.590	4.164
3	0.352	12.095	0.524	11.571	9.998
4	*	*	*	*	*
5	1.123	7.908	0.996	6.912	6.141
6	0.472	6.762	0.696	6.066	6.598
Average	0.536	8.148	0.591	7.556	6.192

*Trivalent chromium analyses were not conducted on test run number four.

The formula for calculating the amount of unknown present by the reverse isotope dilution method is:

$$X = \frac{Y}{R - 1}$$

where X = mg of SO_4^{--}/3 ml of test solution
Y = mg of SO_4^{--} added
R = the activity of the control (counts/minute) divided by the activity of the unknown solution (counts/minute).[8]

Test Results and Discussion

The results of the quantitative tests are summarized in Tables I, II and III. The trivalent chromium analyses were run in duplicate and the sulfate analyses in triplicate. The values given in the tables are average results for these tests. Examination of these tables has led to the following conclusions:

TABLE III. REGENERATING EFFICIENCIES

A Test Run	B Per cent Sulfate Recovered	C Per cent Chromium Recovered	D Ratio of Col. B/ Col. C
1	110.5	61.1	1.80
2	8.3	63.2	0.13
3	23.0	86.9	0.26
4	32.5	*	*
5	45.4	88.8	0.51
6	22.7	108.8	0.21
Average	40.4	79.4	0.51

*Trivalent chromium analyses were not conducted on test run number four.

1. No significant change in the sulfate concentration was noted due to electrolysis. This fact shows that the sulfate ion does not affect chromium plating by entering into the actual oxidation-reduction mechanism and also that it forms no insoluble products as a result of the plating process.
2. An average of approximately seven per cent of the total sulfate concentration was removed from the electrolyzed solution by a cationic resin column as shown in Table I. In order to determine whether this loss was due to actual cationic exchange instead of simple mechanical adsorption of free sulfate a control was run in the absence of trivalent chromium. A solution was prepared containing 250 grams per liter of CrO_3 and a CrO_3/SO_4 ratio of 100 to 1. All of the chemicals used were of reagent quality and free from trivalent chromium. A 750-ml portion of this solution was diluted to 1500 ml with distilled water and run through the cationic resin exchange column in a manner identical to that used in all of the tests described in this paper. Sulfate analyses then were made on both the starting solution and the effluent from the column. The starting solution and the column effluent were found to contain 2.400 and 2.415 grams per liter of sulfate respectively. This proved that sulfate is lost to the resin only in the presence of trivalent chromium and in the form of a positive complex ion.
3. Of the amount of cationic complexed sulfate removed by the column, an average of 40 per cent was regained as shown in Table III. The differences between regeneration efficiencies noted in Table III are due largely to differences in methods of regeneration. However the difficulty in removing the sulfate containing complex was shown definitely.
4. Further proof of the presence of complex chromic sulfate ions was given by the fact that of the 92

per cent of trivalent chromium adsorbed by the column, an average of 79 per cent was recovered in the regenerating acid solution as shown in Table III. This was twice the regeneration efficiency of the complexed sulfate ion. Theoretically, the higher the positive valence of an ion and the larger its ionic size the harder it is to remove from the exchange resin. The fact that chromium has a valence of plus three means that it will be held relatively fast to the resin in comparison to an ion of equal size and lower valence. Since the valence of the complex would hardly be more than plus two or in part plus four (taking into consideration the minus two charge of the sulfate and a possible binuclear structure) the size of the ion must be considerably larger than the chromic ion. This accounts for the fact that the chromic ion was removed twice as easily as the chromium-sulfate complex ion.

Discussion

Although the presence of trivalent chromium does produce a distinct decrease in the electrical conductance of chromic acid plating baths,[10] plating has been done directly from trivalent chromium solutions.[11] This fact leads to the conclusion that in a pure solution of chromic acid the formation of trivalent chromium itself does not retard plating, but rather it forms certain compounds which polarize the cathode. Such a compound has been postulated by Erich Müller[1] and others who state that the *p*H near the cathode is high enough (between 2 and 3) to permit the formation of a basic colloidal layer of $CrOHCrO_4$. This layer is permeable to the small, highly mobile hydrogen ions but will not permit the hexavalent chromium ions to reach the cathode where they may be reduced. Hence in a bath of pure chromic acid only hydrogen is evolved. However when sulfate or some other ion such as chloride, fluoride and fluoborate is added to the bath the chromium will plate.

Although conclusive experimental data proving the function of these ions and the sulfate ion in particular are lacking, certain fundamental facts of chromium plating point to the importance of the formation of a positive chromium-sulfate complex ion such as that found in the work explained in this paper. When the sulfate ion is added to a chromium plating bath it combines with the available trivalent chromium to form complex species of the Werner-type according to the following equation:

$$mCr^{+++} + nSO_4^{--} + xH_2O \rightleftarrows [Cr_m(SO_4)_n \cdot xH_2O]^{3m-2n}$$

This reaction is rather slow with low concentrations of Cr^{+++} and SO_4^{--} and would not take place immediately in a new plating bath. For this reason fresh commercial plating solutions must be run with "dummy" cathodes for from a few hours to many days depending on the rate of formation of trivalent chromium. It is also to be expected that too small an amount of sulfate would reduce the rate of formation of any complex ion and thus reduce the efficiency of the plating bath. There is also an optimum concentration of sulfate which can be present. Above this value the efficiency of the plating reaction is greatly reduced and plating may even stop completely. With a higher concentration of sulfate present, complex ions containing a greater number of sulfate groups are formed. These complexes would be anionic in nature and thus would not migrate to the cathode film layer.

In order to explain the above facts, the following theory is offered. At the cathode in a pure chromic acid bath the insoluble basic compound $CrOHCrO_4$ is formed. When the sulfate ion is added to the bath, it combines with the available Cr^{+++} to form a positive complex ion such as $Cr(OH_2)_xSO_4^+$ which shifts the equilibrium of the insoluble $CrOHCrO_4$ and causes it to ionize.

$$CrOHCrO_4 + SO_4^{--} + xH_2O \rightleftarrows [Cr(OH_2)_xSO_4]^+ + OH^- + CrO_4^{--}$$

The freed hydroxyl ion then moves toward the anode and the compound dissolves thus permitting the hexavalent chromium ion to compete with the hydrogen ion in the reduction process.

Based on the results of the several tests conducted and the discussion evolved therefrom, it is concluded that a chromium sulfate complex is formed in the chromic acid plating bath during electrolysis, and that the function of this complex is to dissolve the basic colloidal compound around the cathode, thus permitting the free migration of the hexavalent chromium ion to the cathode where it may be reduced to the metal.

Acknowledgment

The authors wish to express their appreciation to their co-workers at the Rock Island Arsenal Laboratory for their assistance and to the Ordnance Corps, Research and Development Division of the Department of the Army and the supervisory staff of the laboratory for permission to publish the information in this paper.

References

[1]Erich Müller (Tech. Hochschule Dresden), Reichsamt Wirtschaftsausbau, Chem. Ber. Prü-Nr. 15 (PB52010), 61–69 (1942).

[2]C. G. Fink, U. S. Patent 1,581,188 (April 20, 1926).

[3]George Dubpernell, Modern Electroplating, p. 120, published by The Electrochemical Society, N. Y. (1942).

[4]R. Seegmiller and V. A. Lamb, Proc. Am. Electroplaters' Soc. 35, 125–132 (1948).

[5]Hobart H. Willard and Philena Young, Trans. Electrochem. Soc. 67, 347–356 (1935).

[6]G. Friedlander and J. W. Kennedy, "Introduction to Radiochemistry," John Wiley & Sons, Inc., N. Y. (1949).

[7]Stanley L. Eisler, Plating 39, 1019–1023 (Sept. 1952).

[8]Melvin Calvin, "Isotopic Carbon," John Wiley & Sons, Inc., N. Y. (1940).

[9]H. H. Willard and R. Schneidewind, Trans. Electrochem. Soc., 56, 333–349 (1929).

[10]Gunter Dehmel, "Metall-und Schmuckwaren," Fabrikat Verchrom, 24, 16 (1943).

[11]R. R. Lloyd, W. T. Rawles and R. G. Feeney, Trans. Electrochem. Soc. 89, 443–454 (1946).

41ST ANNUAL AES CONVENTION

July 12-15, 1954

Plans for the Forty-First Annual Convention of the AES to be held in New York City at the Statler Hotel, July 12–15, are running along smoothly, and from all indications, this will be the most outstanding convention to date.

Martin Maher and Albert Fusco, co-chairmen of the Preregistration Committee, have announced that a member may register for himself and his wife by enclosing $40.00 for their combined registration. Upon arrival it will be necessary for him to pick up only one envelope, thereby eliminating the need for his wife to stand in line to register. This same procedure may be followed by companies who may wish to register several of their men (wives, if desired). The registration fee of $20 per person ($12.50 for children under 12) should be attached to company letterhead. One person may pick up all registrations for the company. As mentioned in a previous release, the committee will refund money in full for any registrations not used.

Angelo Amatore and George Herrmann, Hotel and Banquet Cochairmen, report that rooms at the Statler are being reserved at a rapid pace, and suggest that in order to be sure of a room at the Convention Headquarters, people planning to attend should make reservations at an early date.

Moe Ranno, Chairman of Visitors' Entertainment Committee, announces that tickets for radio and television shows will be available any time during the convention. Broadway shows, night clubs, fishing trips, tours, visits to many famous sites, etc., will be available to conventioneers.

Jim Clifford, Entertainment Chairman, reports that he has arranged a top-notch program to be presented at the banquet.

Phil Bruno, Outing Chairman, has lined up a fine program for the boat ride and outing to be held Wednesday, July 14.

Milton Nadel, Educational Chairman, has announced that an additional technical session is being scheduled for Wednesday morning. This will provide educational sessions for each day of the convention.

Brief summaries of some of the papers to be presented during the educational sessions are given below.

The paper, "Disposal of Plating Wastes," by Drs. Charles A. Walker and Barnett Dodge, summarizes the work that was involved in the installation of a waste disposal system in the main plant of a silverware manufacturer.

R. M. Operowsky gives detailed information in his paper, "Modern Industrial Paint Strippers," on the chemical composition and properties of the various materials which paint strippers must remove.

"Industrial Applications for Metalized Nonconductors," by Dr. Harold Narcus, discusses the use of metalized nonconductors in the fields of printed circuitry, electroforming, electronics and in certain miscellaneous applications.

In the paper, "Stress in Chromium Deposits," by A. C. Tulumello, E. J. Seyb and J. E. Stareck, it is shown that stress is correlated with electroplated chromium's crack pattern.

L. H. Curkin and R. W. Moeller also discuss stress in their paper, "Stress Effects of Iron in a Watts' Type Nickel Plating Solution and Its Correlation with Endurance Limit."

The paper, "Technology of Liquid Buffing Compositions," by R. V. Twyning, describes chemically and practically several factors involved in these compositions; such as, cleanability, emulsion stability, viscosity and others.

The AES Research Committee will submit three complete reports of some phase of project activity. A paper being prepared by Dr. D. T. Ewing of Project 5 is a full report, the 8th in the series on Effects of Impurities and Purification of Electroplating Solutions, and deals with the "Effects and Removal of Lead" from nickel plating solutions.

Dr. Linford's Project 12 group is presenting "The Cleaning and Preparation of Metals for Electroplating. Part IX. The Equipment to be Used for Determining the Effects of Oxide Films."

Dr. A. E. R. Westman of Project 14 will present a paper on "Improved Methods of Taper Sectioning."

Space limitations prevent the publication at this time of summaries of the other papers on the technical program. These will be covered in detail in the full program for the entire convention that will appear in the next issue.

It is a pleasure to state that in addition to the very fine ladies' program, which had been announced previously, the Lea Manufacturing Co., Wagner Brothers, Inc., and the F. L. and J. C. Codman Co. have agreed to sponsor jointly a ladies' tea, which will be held Monday afternoon, July 12. The committee wishes to thank the above and all other firms who are aiding in making this a really outstanding program.

project no. 6

project director:
N. THON*†

associate:
DOUGLAS DEAN†

location:
FRICK CHEMICAL LABORATORY

PRINCETON UNIVERSITY, PRINCETON, N. J.

Acknowledgment is due the Research Committee, Dr. W. A. Wesley, The International Nickel Company, Chairman; the Research Directing Committee, Mr. Guy M. Cole, Ternstedt Division, General Motors Corporation, and Dr. Donald Price, Oakite Products, Inc., Chairman and Vice-Chairman, respectively; and the Project Committee, Dr. Louis Weisberg, Consultant, New York City, Chairman; Dr. B. Egeberg, International Silver Company, and Mr. Clifford Struyk, General Chemical Division, Allied Chemical & Dye Corporation, for their contributions to this project.

*Deceased. At the time of Dr. Thon's death, some of the last results obtained by this Project had not been submitted for publication. The present report is taken verbatim from the final report submitted by Dr. Thon to the Project Committee. The supplement was transmitted by letter to Dr. Louis Weisberg.

†AUTHORS

POROSITY OF ELECTRODEPOSITED METALS

XIII. VARIATION OF THE GAS PERMEABILITY CONSTANT WITH PRESSURE DIFFERENCE

SUMMARY

This is the final report from Project 6. It describes an improved permeability apparatus by means of which measurements have been made over larger foil areas. This apparatus has been used to study the variation of permeability as a function of the overpressure. With increasing overpressure, the permeability constant passed through a minimum in all cases.

Introduction

One of the controversial points in connection with the gas permeability of thin electrodeposited foils was the question of independence of the permeability constant k of the overpressure used in its determination. From early experiments of Project 6, it appeared that k was independent of the overpressure. More extended determinations made by Project 13 showed, in contrast, a systematic variation of k with the overpressure. It appeared of interest to take the question up once more and to make a very thorough study of it. The results here reported are the fruit of very extensive and repeated experiments, with special emphasis on the reliability of the vacuum tightness of the apparatus which was tested systematically before, between, and after experiments.

Experimental

New Holder

These experiments were made with the new type of holder (See Fig. 1), described in previous Project reports, in which vacuum tightness is ensured with the aid of two buna rubber rings.‡ The rings, of circular cross section, are put around circular projecting brass rims machined onto the flanges of the two parts of the holder; the size of the ring is so chosen that, prior to tightening, the rubber ring is slightly higher than the inner brass spacer ring. The foil is put between the two rub-

‡Supplied by Beemer Engineering Co. (Arrowhead), 401 North Broad Street, Philadelphia 8, Pa.

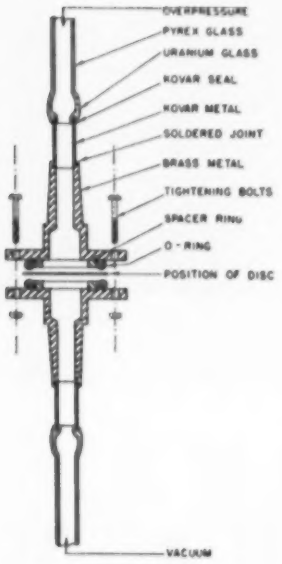

Fig. 1. O-ring disc holder

ber rings and the two parts of the holder are drawn together with the aid of three bolts. The rubber rings are thus compressed and flattened out until they become rigorously level with the brass rim. The amount of tightening is thus always the same. There is no uncertainty and no arbitrariness about the amount of tightening, and there is no screwing motion. Vacuum tightness becomes perfect after the fresh rings first have been outgassed thoroughly by evacuation for several days. As further steps, the number of glass stopcocks was reduced to the minimum and the vacuum stopcocks ground in. The wax seals between metal and glass have been replaced by cover joints.

Effect of Storage Time

The experiments represented by Figs. 2, 3 and 4 were done on the foils supplied by Project 13. These foils had been stored in the laboratory for some time, and probably had undergone some amount of invisible corrosion, as a result of which their k values may be considerably higher than they were when first made by Project 13.

The determinations have been done repeatedly, and every time curves of the same form were obtained. There is some uncertainty about the exact positions of the points, which vary somewhat in repeated determinations, but there is no uncertainty whatsoever about the shapes of the curves. In all cases, there was a hysteresis effect as between a series run with increasing, and the one run with decreasing overpressure. And, always, k as a function of the overpressure passed through a minimum.

The authors cannot but content themselves with recording the facts which they believe are experimentally well ascertained; they have no interpretation to offer at this time. As was correctly pointed out by Project 13, there are doubtlessly several kinds of flow present across the invisible pores of these foils, but it is not known yet what they are. The authors' new results, which are at variance with both the early (and, as it now turns out, rather hasty) conclusion of a constancy of k, and the uniform variation of k asserted by Project 13. There must be at least two kinds of flow, one decreasing, and the other increasing with increasing overpressure—the antagonism resulting in a minimum. Depending on the relative importance of the two types of flow, which can vary from one specimen to another, the minimum *can* become so flat as to escape notice, and simulate a constant k; the range in which k falls to a minimum *can* be so narrow as to escape notice, and simulate a steady increase of k with increasing overpressure throughout. Project 6 was lucky enough to observe the minimum beyond doubt, and thus to get a first indication of the existence of at least two types of porosity, behaving differently towards an increase of the overpressures. The phenomenon is now sufficiently well established experimentally to warrant and to call for further investigation and elucidation of the nature of this twofold porosity.

Porosity of Larger Specimens

A second item to report is that of porosity determinations on larger specimens. The rubber-ring type holder appeared suitable for foils of any desired diameter, and the Project had one built to accommodate foils with an exposed area of 1½ inches. There should be no difficulty about building holders of this type for even larger specimens. With this holder, the authors investigated specimens cut out from a large 2-mil thick sheet of electrolytic nickel* which had been given to the Project some 2 years ago, and had since been stored, in the open, in a room adjacent to the laboratory. In Project experience, this nickel should, over that period, have undergone some degree of invisible corrosion, which might have resulted in fine invisible porosity and gas permeability. A large number of samples were cut out from this sheet, at different places, and *all* of them, though carefully inspected in transmittance under a low-power binocular microscope and found free from visible pores, showed gas permeability to varying degrees. Evidently, the 1½-inch size was sufficient for *every* specimen to have areas which had become gas permeable. The tightness of the apparatus was tested time and again between runs, and there was no trace of permeation with copper foils inserted instead of the electrodeposited nickel foils.

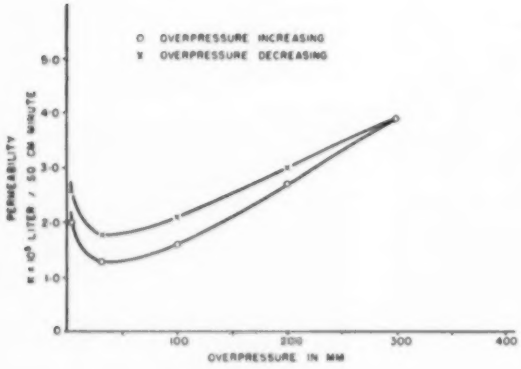

Fig. 2. Disc Q 8

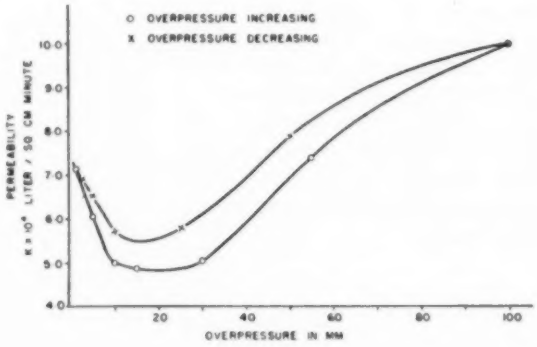

Fig. 3. Disc N 1

*Supplied by United Chromium, Inc., New York, N. Y.

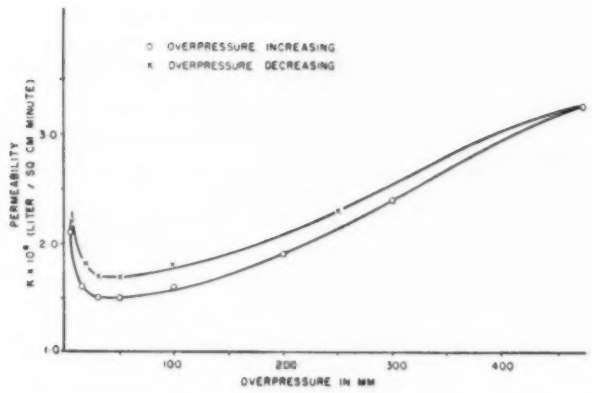

Fig. 4. Disc X 13

With the latter, there was always some permeation, in the absence of visible pores.

Conclusions

It had been said, at a meeting held at Philadelphia a number of months ago, that the Project's early findings of gas permeability of electrodeposited foils had been, subsequently, "discredited." Maybe these recent findings, with larger specimens, are apt to rehabilitate those early findings. True, the authors are dealing with material which had been exposed to very slow corrosive action over a long time. Still, there are no *outward* signs whatever of corrosion, and there is distinct gas permeability in *each* case—and that with 2-mil thick sheet. There is little doubt that, with the use of sufficiently large specimens, *initial* gas permeability will be found consistently in thin foils as deposited. It may yet be that the discredit qualifications will be discredited.

This winds up the work of Project 6 on a note which is characteristic of work having accomplished *something*—namely, along with some established new facts, a host of further questions definitely deserving further investigation.

Supplement

The junior author, having expressed his eagerness to obtain more results, put to a thorough test the large holder described in previous Project reports. A sample of 50-micron electrolytic nickel stock was corroded slightly in acetic acid in order to attain a comfortably measurable gas permeability. The sample was free from visible holes. It was, of course, thoroughly washed and dried. Under constant atmospheric overpressure, a first determination gave $10^7k = 9.8$. Repeated determinations after a few days gave $10^7k = 6.1$. On account of this change, the determinations were repeated at a few days' intervals. The slow decrease of k continued, through $10^7k = 4.9$ and finally, 4.3, at which value k became stabilized and did not change any more. This is one result worth reporting. This stabilized foil then was measured under different overpressures. The results were as follows:

overpressure mm	10^7k
10	7.8
20	6.2
50	5.3
150	4.4
450	4.3
760	4.3

The measurements were repeated in rising and in falling overpressure, and the points fell exactly on the same curve. There was no hysteresis whatever in this case.

So, in this instance, k first fell—very distinctly—with rising overpressure, then leveled off and remained constant and overpressure-independent. There was no increase of k with increasing overpressure in any range.

This result vindicates early Project findings of an overpressure-independent k. It was no mistake. There *is* a type of porosity which is independent of the overpressure, in quite a wide range. In this instance, this particular type of porosity apparently is linked with the specific nature of corrosion by acetic acid. But the Project previously had encountered the same type with foils not so treated.

It all goes to show that there are different kinds of fine invisible porosity, distinguished by different types of overpressure dependence. A fall of k with increasing pressure, at very low overpressures, seems to be a frequent feature, indicative of one type of very fine porosity. Further increase of the overpressure either may balance it and lead to pressure-independent permeability, or, in other instances, result in a reversal, as a new type of porosity comes to the fore. The phenomena (which are now established beyond doubt as far as they go), it is believed, are deserving of further study.

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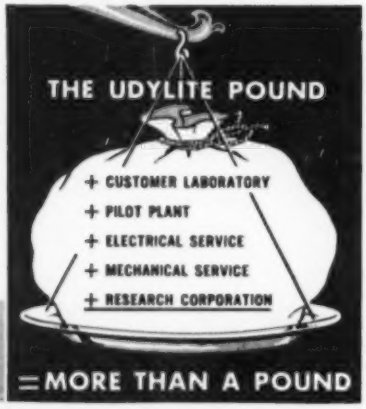


Book Review

DR. HAROLD J. READ

Professor of Metallurgy, The Pennsylvania State University

ORGANIC PROTECTIVE COATINGS, edited by William von Fischer and Edward G. Bobalek, viii + 387 pages, 1953. Reinhold Publishing Corporation, 330 West Forty-second Street, New York 36, N. Y. Price, $7.50.

The tremendous developments of the last few decades have transformed the field of organic protective coatings from a helter-skelter empirical art to an enormously complex industrial activity where scientific approaches and techniques are becoming ever more dominant. Indeed, most of the important developments have been, directly or indirectly, the result of fundamental chemical research. Reference books which reflect this situation are not numerous, neither are they easy to write. The text edited by von Fischer and Bobalek from contributions by eighteen authors is an excellent example of what has been needed. It is comprehensive without being bulky, and it is easy to read even though the treatment of all subjects is technical and scientific rather than "practical."

The fact that the book comprises chapters on specific subjects by many different authors might be expected to lead to a lack of unity in the book as a whole. To a certain degree this is true, but it appears not to be a serious fault.

Several chapters are concerned with general problems common to the entire field of organic coating technology. Amongst the subjects so treated are the principles of formulation, theoretical considerations regarding the significance of pigment dispersion, design for reflectance properties, reflectance spectrophotometry of pigmented materials, color-matching calculations, and metal protection with synthetic resin coatings. Apparatus, techniques and theories applicable to these and other pertinent fields of investigation are presented with emphasis on how they can be used to attack problems of paint formulation.

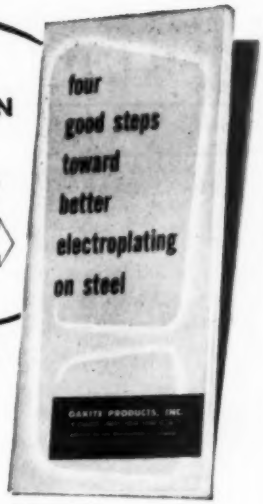
The major portion of the book is made up of chapters on specific types of coatings. Each emphasizes specifically the problem of formulation, specification and application for a coating and is a sort of case history of progress in a special field. Some of the types of coatings chosen for such treatment are the vinyl resins, the aminoplast resins, latex paints, silicon resins, and hot-spray lacquers.

Although references to the literature are by no means exhaustive, there are enough citations in most of the chapters to serve as reasonably satisfactory guides for additional reading.

Printing, illustrations and binding all meet the high standard which has marked the work of the publisher.

HAVE YOU TAKEN THE FOUR GOOD STEPS?

See page 6



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- ¶ Which costs more: good electrocleaning or poor electrocleaning? *See page 4.*
- ¶ How can cleaning costs be reduced 33% while plating quality is being improved? *See pages 7 and 8.*
- ¶ What are four easy ways to improve the average rinse tank? *See page 10.*
- ¶ What rinsing fault is "an invitation to trouble" in the plating of high-carbon steel? *See page 11.*
- ¶ Why is it better to clean steel with reverse current than with direct current? *See pages 12 to 14.*
- ¶ What causes hydrogen embrittlement during electrocleaning? What is the remedy? *See pages 15 and 16.*
- ¶ One part chromic acid in 1,000,000 parts of cleaning solution—does that spell D-A-N-G-E-R? *See page 16.*
- ¶ How can an ordinary electrocleaning cycle be transformed into an exceptionally good cycle? *See Cycle E on page 23.*

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QUESTION BOX

readers' questions of general interest

Q. 175. What method of etching is used on hard nickel deposits to continue plating with safety, once parts have been withdrawn to check thickness with a micrometer and then reimmersed in the plating bath?

A. The following procedure has been used successfully after micrometer thickness measurements although it is, of course, preferable not to withdraw and handle such work, if at all possible.

Alkaline cleaner dip and scrub with pumice.
Cathodic alkaline cleaner 1–2 minutes and scrub.
Rinse, followed by a second 1–2 minutes in an alkaline cleaner.
Rinse, then etch in 22 oz/gal H_2SO_4 at 20 amp/sq ft, anodically for ten minutes.
Increase the anodic etching current to 200 amp/sq ft for 2 minutes.
Direct current etch in 22 oz/gal H_2SO_4 at 200 amp/sq ft for 2–3 seconds.
Rinse and nickel plate.—A. D. Squitero.

Q. 176. What type and grit numbers of grinding wheels are recommended to grind hard nickel plate on crankshafts—normal wheels seem to pack up with the nickel?

A. It would appear that not so much the type and grit number of the grinding wheel is important in the problem as is using the wheel with the correct coolant. The use of a coolant made of 75 per cent mineral seal oil and 25 per cent kerosene is suggested. Also suggested would be a highly soluble sulfurized oil coolant. If neither one of these coolants solves the problem, then, as a last resort, it may be necessary to go to a grinding wheel treated with rosin to give the free cut and nonloading features required.—Howard J. McAleer.

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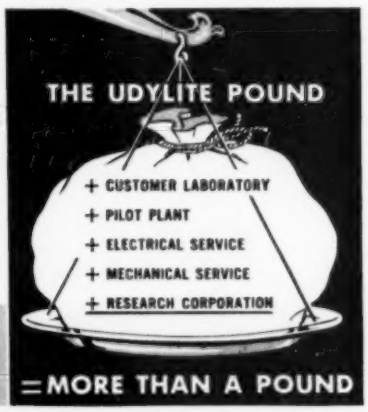

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Article Abstracts

No copies of articles are available at the offices of "Plating". Photostats may be had from libraries having files of the journal in question and offering photostat service, usually at 30-50 cents a page. Ask your public library to consult the Union List for names of libraries having the particular journal. Abbreviations used are those of Chemical Abstracts.

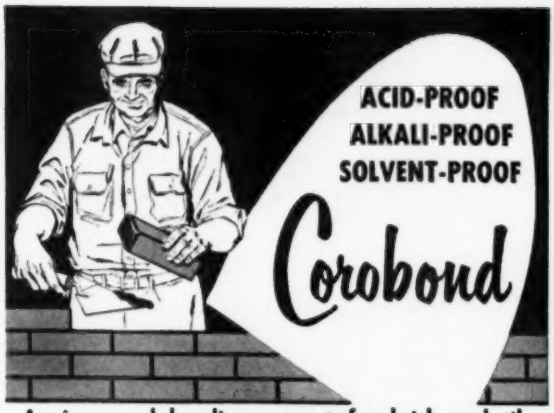
Rapid Porous Chromium Plating. D. V. Pletnev and V. N. Brusentsova. Vestnik Mashinostroeniya, 32, 1952, No. 2, pp. 37–40; 8 figures, 1 table, Technical Translation No. 2953.

Experimental study of most favorable type of porosity in porous chromium deposits produced at conventional current densities is described. Suitable conditions of accelerated porous chromium plating at high current densities (up to 1400 amps/sq ft) to give the same porosity pattern. Operating bath temperatures: from 105 to 131° F. Basis material used in tests: cast iron piston rings. Particulars on four rapid plating practices studied and quality and thickness of chromium deposit, porosity pattern and depth obtained with the four practices are given. Two precautions to be taken in rapid porous chromium plating are noted.—HENRY BRUTCHER.*

Mechanical Process for Porous Chromium Plating. G. S. Samoilovich and N. G. Andreev. Vestnik Mashinostroeniya, 32, 1952, No. 11, pp. 49–52; 8 figures, Technical Translation No. 3090.

Report on a simple mechanical process of porous chromium plating, developed by authors and requiring no special plating room equipment and no close control of temperature and composition of plating solution or current density. Particulars on a knurling mechanism (Figs. 6–8) for impressing small but relatively deep holes into surface to be plated are given. Ease of control of distribution, number, size, and shape of these holes; details on knurling procedure

*P. O. Box 157, Altadena,, Calif.



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and on all subsequent operations (with engine liners) are listed. Test stand results obtained with air-cooled multicylinder engines running under forced conditions with liners given a porous chromium deposit according to the proposed mechanical process as against nitrided liners are detailed. Usefulness of authors' processes for machine parts other than engine cylinders is noted.—HENRY BRUTCHER.

Discharge of Complex Ions. H. Gerischer, Z. f. Elektrochem. **57**, 604 (1953) and also Z. f. physik. Chem. **202**, 292–317 (Oct. 1953).

The relation between the exchange current density (measured by the impedance method at equilibrium potential for the discharge of complex metal ions on metal amalgams) and the concentrations of complexing agent, metal ion and amalgam makes it possible to determine which complex is actually discharged (potential determining complex or step). Gerischer confirms Haber's findings that in many cases discharge cannot occur over "free" or hydrated metal ions formed by dissociation of the complex. On the other hand, it is frequently not the predominant complex, but a compound of lower coordination number which is discharged, even if present in only small concentration. Gerischer comes to the following conclusions: from zincate solutions, where $[Zn(OH)_4]^{--}$ is the predominant complex, $[Zn(OH)_2]$ is the species being discharged; from zinc solutions containing alkali hydroxide and cyanide, where $[Zn(CN)_4]^{--}$ is the predominant complex, it is again $[Zn(OH)_2]$; from ammoniacal zinc solutions, where $[Zn(NH_3)_2(OH)_2]$ is the predominant complex, discharge occurs from $[Zn(NH_3)_2]^{++}$ and $[Zn(OH)_2]$; from cyanide cadmium solutions, where $[Cd(CN)_4]^{--}$ predominates, $[Cd(CN)_3]^{-}$ and $[Cd(CN)_2]$ are discharged depending on the concentration of free cyanide.—OTTO KARDOS.

Rapid Control of Metal Deposits From Certain Electrolytes. E. Bertorelle, Metalloberflache **6B** 2 (Jan., 1954).

The use of plating cells for the control of plating operations is discussed with particular reference to

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MAY 1954

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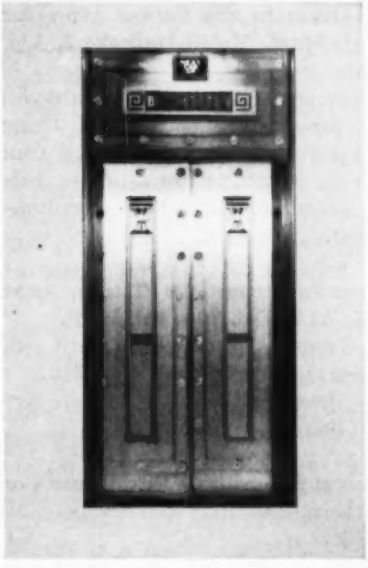
Here are some case histories showing how the Lea Method of Satin Finishing has helped cut production costs.

ALUMINUM

Material — Aluminum.
Article — Furniture trim.
Method of Forming — Punching and stamping.
Final Finish — Satin.



Lea Method:
1. 120 set-up wheel.
2. Lea Compound Grade "L" or "C" on 10" diameter loose muslin buff at 1500 r.p.m.
3. Anodize.

Remarks —
Previously this work had been done by the use of Tripoli buffing after the polishing wheel operation, resulting in some polishing marks remaining. This step involved excessive cleaning which was entirely eliminated by the Lea Method.

BRASS

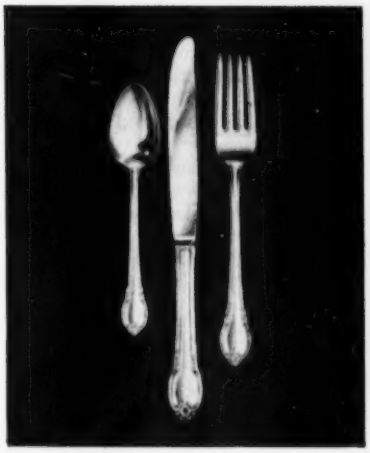
Material — Brass.
Article — Heavy Door Pulls.
Method of Forming — Casting & machining.
Final Finish — Satin finish.
Lea Method:
1. 100 set-up wheel (canvas).
2. 120 set-up wheel (felt).
3. Grade "B" Lea Compound on a 10" diameter muslin buff with radial sewing at 1800 r.p.m.
4. Lacquering.

Remarks —
The Lea Compound step was done in the same direction as the last polishing wheel operation so that there was no crossing of lines. The finish desired was produced with a minimum number of wheel operations and all cleaning eliminated.

STEEL

Material — Steel.
Article — Escutcheon plates, door plates, etc.
Method of Forming — Stamped.
Final Finish — Special satin brass plate.
Lea Method:
1. Brass plate.
2. Lea Compound Grade "R" on a 10" loose buff at 1500 r.p.m.
3. Lacquering.

Remarks —
In substituting for wet scratch brushing, the Lea Method eliminates all cleaning and drying and the nuisance of water stains on the brass surface.



SILVER

Material — Silverplate.
Article — Tableware.
Method of Forming—Forging (nickel silver).
Final Finish — Butler Finish.*
Lea Method:
1. Silver plate.
2. Lea Compound Grade "FG," "MF," or "MH" on 6" brass wire wheel at 800 r.p.m.

Remarks —
Fine grades of Lea Compound on a brass wire wheel produced the bright line finish required without the aid of a prior color buffing operation common to the old wet scratch brushing procedure.

*Butler Finish — A fine delicate satin finish with some brilliance.

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Article Abstracts

the use of the author's three cornered (equilateral triangle design) cell which is 172 mm on a side, 60 mm high, carries an anode 60 mm long extending along one side. Opposite the anode, extending from and bisecting the angle is a cathode 100 mm long. The end of the anode and cathode not in the corner are shielded. Using this cell, two plating ranges can be studied—one on the cathode side nearer the anode and the other on the cathode side farther from the anode, 0–50 amps/sq ft and 0–25 amps/sq ft respectively, for example. Application to the control of fluoride in zinc sulfate solution is discussed and photographs of cathodes are shown.—D. G. FOULKE.

Indium Plating of Bearings. E. R. Thews Metalloberflache **5**, B134 (Sept., 1953) American, German, British Practice for the Plating of Bearings are Compared.

Instead of the combination: silver-lead, followed by a thin indium coating, which is alloyed with the lead by thermal diffusion, a final tin coating is less expensive and gives better corrosion resistance than indium. The various indium plating solutions such as the sulfate, perchlorate and especially the cyanide baths are discussed.—OTTO KARDOS.

Chromium Deposition in the Patent Literature Since 1941. F. Markhoff, Metalloberflache **7**, A149, No. 10 (Oct., 1953).

An extensive summary of the literature on decorative and hard and porous chromium plating. Plating from trivalent chromium solutions covered. Chromium plating of light metals, engine cylinders, tubes and a number of special applications are described.—OTTO KARDOS and D. G. FOULKE.

Special Equipment for Chromium Plating. Anon., Metalloberflache **7**, A149, No. 10 (Oct., 1953).

Equipment for chromium plating in full and semi-automatic conveyors and barrels and the plating of large cylinders are described. Twelve figures.—OTTO KARDOS and D. G. FOULKE.

The Electrochemical Behavior of Metals and Corrosion. M. Pourbaix, Chemistry and Industry No. 30, 780 July 25, 1953.

Experimental work carried out at Centre Belge d'Etude de la Corrosion with respect to application of fundamental electrochemistry to corrosion problems is presented. For the reactions:

$$2H^+ + 2e \longrightarrow H_2$$

and

$$2H_2O \longrightarrow O_2 + 4H^+ + 4e$$

there is a condition of thermodynamic equilibrium in which it is impossible for the reaction to occur. This is a function of the electrode potential, E, and of the

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*p*H of a fraction of the solution in the immediate vicinity of the electrode. Figures showing the thermodynamic stability of water (1 atm), potential-*p*H equilibrium diagrams for iron (in aqueous solutions) and for hydrogen peroxide along with corrosion, immunity and passivation diagrams for iron, copper and lead are given.

Applications discussed include the behavior of iron in alkali bicarbonate solutions, the behavor of stainless steel (type not specified) in acetic acid and an interesting electrical anti-scale treatment of water by which hard water is exposed to a small electrical current before admission into the boiler.—D. G. Foulke.

New Electrosparking Process for the Hard Coating of Cutting Tools. G. P. Ivanov. Stanki I Instrument, **22**, 1951, No. 5, pp. 20–22; 11 figures, Brutcher Technical Translation No. 2821. P. O. Box 157, Altadena, Calif.

Comprehensive investigation of the electrosparking process for the hard facing of tools to improve the electrical factors of the electrosparking machine used, finds the optimum conditions of electrospark hard coating, the most favorable size and location (tool face) of the hard coatings deposited on the tool, and the most suitable electrode material. Particulars on the electrosparking machine used; its advantages over competing models; circuit diagram (Fig. 1); operation of machine. Tool life test procedure and results. Tools used in study: 18–4–1 and 12–4–2½ high-speed steel lathe tools. Hard facing of tools with cemented carbides of different composition, ferrochromium, white iron, etc., by the electrosparking process under mild (6 amps.), intermediate (8 amps.) and severe (10 amps.) conditions and tool life test data. Influence of conditions of hard facing and of condenser capacitance upon tool life at different cutting speeds. Performance data on tools hard coated on different faces and areas differing in size. Recommended ratio of area of hard coating to size of cut. Influence of duration of electrosparking upon tool life; recommended electrosparking time. Effect of initial hardness of tool on performance after electrospark hard facing; optimum Rockwell "C" hardness. Results obtained with a dozen different materials serving as electrodes in electrospark hard facing. Materials recommended as electrodes for best tool life (on soft and hard steels respectively). Advantages of use of a special dielectric coating for intensifying spark and protecting electrode from sticking to tool.—Henry Brutcher.

Etching and Polishing Aluminum. V. Terhune. U. S. Patent 2,657,981 (Nov. 3, 1953). C. A. **48**, 1933 (Feb. 25, 1954).

Aluminum is treated in an alkaline solution at 90–100° containing about 10 per cent of alkali hydroxide, alkali carbonate, or trialkali phosphate and a small amount of cupric or cuprous oxide, hydroxide, or carbonate. After the treatment the aluminum has a sur-

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face of high luster which is of substantial permanence and is ready to be plated with copper or other metals. The percentage of the copper compound added to the solution does not have any influence upon the reaction.

Surface Treatment of Aluminum. B. W. Floersch. U. S. Patent 2,655,439 (Oct. 13, 1953). C. A. **48,** 1932 (Feb. 25, 1954).

A surface treatment for aluminum which removes oxides and provides low surface resistance comprises cleaning in an alkaline solution, immersion in a solution containing Cr_2O_3 0.1–1.0, fluoborate salt 0.5–6.0, and HNO_3 2.0–12.0 per cent by weight, and postetching in a fluosilicic acid solution.

Statistical Theory of Extreme Values and Some Practical Applications. E. J. Gumbel, National Bureau of Standards Applied Mathematics Series 33, 51 pages, 10 tables, 38 figures, 40 cents. (Order from Government Printing Office, Washington 25, D. C.)

This is the revised text of material presented in a series of four lectures given by the author at the National Bureau of Standards. It is the first comprehensive statistical treatment concerned with an extensive series of recent problems of considerable interest to engineers and statisticians. The procedures developed by many persons working in different fields are brought together here in systematic fashion. Understanding of the mathematical features is facilitated by intuitive considerations and graphical procedures based on the recently published "Probability Tables for the Analysis of Extreme-Value Data" (NBS Applied Mathematics Series No. 22).

The methods described are based on the asymptotic theory of extremes. This theory is developed, and it is shown how phenomena of great practical interest, such as floods, droughts, breaking strengths of materials, maximum gust loads, extremes of temperatures, pressure, and many others, can be treated as extremes of large samples. The methods are illustrated by many examples of actual data together with the necessary tables and graphs. The monograph also includes a full set of instructions for applying the techniques in practice and features an extensive bibliography.

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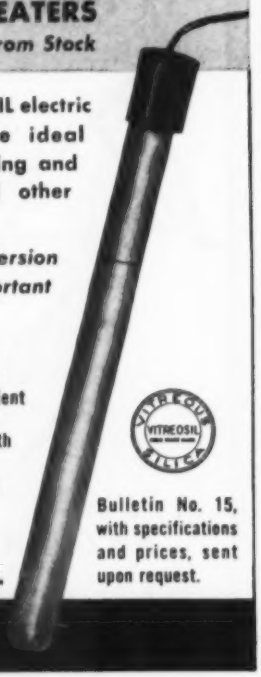

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Patent Abstracts

GEORGE B. HOGABOOM

Copies of patents may be obtained by writing to Commissioner of Patents, Washington, D. C. Price 25 cents each.

No. 2,662,054, December 8, 1953—Method of Electrodepositing Chromium Directly on Aluminum—Frank Passal, assignor to United Chromium, Inc.

An aluminum article on which chromium is to be deposited is immersed for about 10 to 15 seconds in an aqueous alkaline zincate cuprocyanide solution.

The preferred composition of the dip solution is as follows:

Zinc oxide	90 g/l (12 oz/gal)
Sodium hydroxide	429 g/l (60 oz/gal)
Copper cyanide	7.5 g/l (1 oz/gal)
Sodium cyanide	15 g/l (2 oz/gal)
44° Baumé at 80° F	

In the preliminary cleaning, before the immersion of the aluminum article in the acid pickle, the aluminum article is given an additional dip in a solution of nitric and hydrofluoric acids, such as one containing 3 parts concentrated nitric acid (70 per cent by weight) to 1 part of concentrated hydrofluoric acid (29 per cent by weight) for about 3 seconds. Alternatively, after the removal of the aluminum article from the acid pickle it may be scrubbed with a tampico brush to remove loosely adherent smut.

CLAIM 1. A method of electrodepositing chromium directly on aluminum consisting essentially of immersing an aluminum article to be electroplated for about 10–15 seconds in an aqueous alkaline zincate cuprocyanide solution to form a zinc-copper immersion coating thereon, removing said article and immersing the same in a nitric acid solution to remove said zinc-copper immersion coating, immersing the article a

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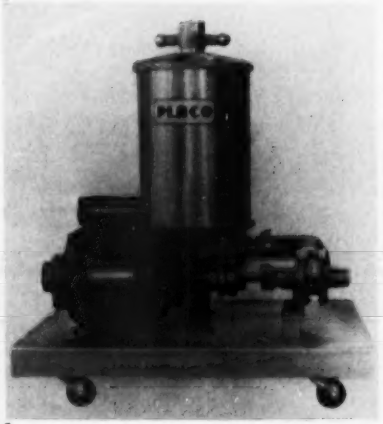

- For all acid and alkaline solutions
- Microscopic clarification including removal of colloidal solids through depth filtration
- Rugged all 316 stainless steel (steel and rubber-lined models available)
- Greater operating convenience—just flip your switch
- Carbon treat while you filter
- Economical—low initial cost, practically no operating cost
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- Ball bearing ring enclosed motors

Unit pictured is a 6 tube unit rated at 600 gal. per hr. at $786.55

100 gal. unit at $277.75

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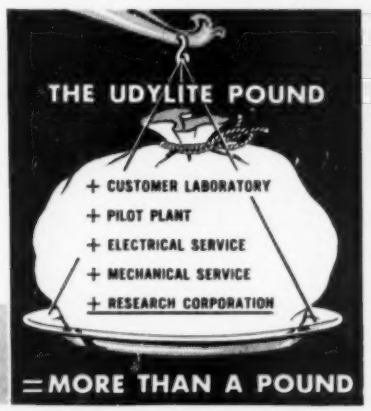

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USE READER SERVICE CARD; INDICATE A 563.

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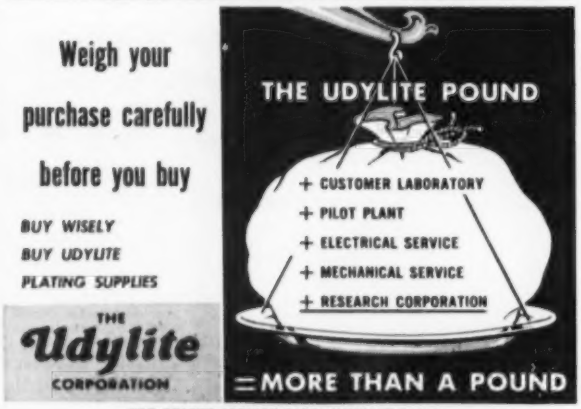

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CAKE, DIP AND SPRAY
CEMENT AND THINNER
for setting up wheels, belts and rolls
HARRISON & COMPANY, INC.
HAVERHILL, MASSACHUSETTS

second time for not more than 15 seconds in the aqueous alkaline zincate cuprocyanide solution to form another copper-zinc immersion coating thereon, removing the article from the latter solution, then immersing said coated article in a chromic acid chromium plating bath to strip completely the zinc-copper immersion coating and within 15 seconds passing electric current to said immersed stripped aluminum article as a cathode to electrodeposit chromium thereon, thus producing a chromium plated aluminum article having no intermediate coating between the chromium and the aluminum.

3 claims.

References cited: U. S. Patents 2,091,386; 2,142,564.

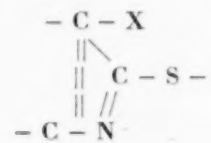
No. 2,663,684, December 22, 1953—Method of and Composition for Plating Copper—William J. Pierce, assignor to Houdaille-Hershey Corp.

It is a further object of the instant invention to provide an improved method of and composition for plating copper from an acid bath wherein only one organic addition agent is employed, the agent or brightener being adapted to operate suitably in the absence or presence of the various control agents, wetting agents and dextrin compounds suggested by prior workers in the art.

EXAMPLE 1. A plating cell was charged with 6.5 liters of plating solution containing 140 g/l of $CuSO_4 . 5H_2O$, 50 g/l of H_2SO_4 and 0.02 g/l 2 methyl mercaptobenzothiazole (brightener). The cell was equipped with electrolytic sheet copper anodes, in accordance with commercial practice. Polished steel cathodes previously cleaned and plated in a conventional cyanide copper solution were plated in this bath. Plating was carried out for 15 minutes at 110° F and 45 amperes per square foot. The resulting plate was bright and repeated tests consistently yielded suitable deposits ranging from "semibright" to "bright".

I claim as my invention.

CLAIM 1. An electrolyte for electrodeposition of copper consisting essentially of an aqueous sulfuric acid-copper sulfate bath, having dissolved therein, as a brightener, a compound having the following heterocyclic ring structure.



wherein X is an atom of group six of the periodic system selected from the group consisting of oxygen and sulfur, that compound having a concentration in said solution within the range of 0.005-1 gram per liter.

19 claims, 14 examples.

References cited: U. S. Patent 2,609,339; Canadian Patent 461,186.

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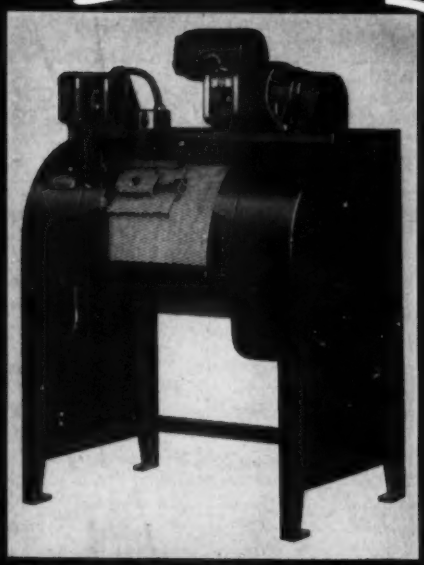

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AES News

Charter Petitions

Added coverage by the Society to new sections in New York and Texas are in sight. Two New York groups have petitioned Headquarters for temporary charters. One group in the Albany, Schenectady, Troy area has selected as its name, "Capitol District Branch"; the other group in the Binghamton, Elmira, Endicott area has selected the designation, "Southern Tier Branch."

A third group in San Antonio, Texas has declared its intention to petition for a temporary charter in the Society.

1954 Convention Credentials Committee

George Wagner, secretary of the Newark Branch AES and proprietor of the Hy-Grade Electro-Plating Company, Newark, N. J., was named Chairman of the 1954 Convention Credentials Committee. This announcement was made recently by AES National President George P. Swift.

Wagner's committee will review all credentials and proxies of Delegates and present its findings for action at the annual meeting of the Supreme Society in New York City this coming July.

Other members of the committee include Milton Nadel of the New York Branch and member of PLATING's Editorial Board; and Dr. D. Gardner Foulke of the Newark Branch and former AES Executive Secretary. Nadel is associated with Berkeley Industries, Inc. of Jersey City, N. J., and Foulke is with Hanson-Van Winkle-Munning Company of Matawan, N. J.

Appointments

Headquarters announces the following appointments to the AES Research nominating committee: R. Ledford, Chairman; C. Sample and J. Teres.

This committee will nominate candidates of whom three will be elected to serve on the Research Committee for the 3-year period 1954–1957.

Also named to serve on the Editorial Board nominating committee were: J. Andrus, Chairman; W. R. Meyer and L. Morse.

This committee will furnish a list of candidates from which three will be elected to serve for the 3-year term 1954–1957.

Another appointment announced by Dr. G. P. Swift is that of W. J. Neill, Society Past President to serve as the official representative for the AES on the 8-state agency ORSANCO. The Ohio River Valley Water Sanitation Commission is now in its 6th year in the work of solving stream pollution problems of the 981-mile Ohio River.

First Annual Tri-State AES Regional Meeting

National AES President, Dr. George P. Swift (second from right) smiles at humorous reference to Tri-State program with Educational Session Speakers. Left to right: Chicago Branch President, J. Andrus of Croname, Inc.; J. G. Seiter, F. J. Stokes Machine Co.; Dr. Swift, National AES Past President, A. Logozzo, Nutmeg Chrome Corp.

Cincinnati Branch President C. H. Truman points to meeting poster held by Regional Meeting Chairman W. W. Loveless. Left to right: R. K. Rarick, Educational Chairman; Truman; Ezra Blount, Editor of Products Finishing and publicity chairmen; William Young, secretary; Charles Wise, chairman of Cincinnati's first educational session held in 1953, (seated) Loveless

Close to 700 members and guests attended the First Annual Tri-State AES Regional Meeting at Cincinnati on April 3. Sponsored by branches representing Cincinnati, Columbus, Indianapolis and Louisville, the one-day session featured an Educational Session in the afternoon and a Dinner Dance. Both affairs were held at the Sheraton-Gibson Hotel.

According to Tri-State meeting Chairman, W. Wilson Loveless, this initial regional meeting was successful in every way. Loveless praised the efforts of his committee and thanked participating branches and the numerous companies for their cooperation and support.

The Educational Session featured National Past President Arthur W. Logozzo, president of Nutmeg Chrome Corp., who showed films on tin plating at the Weirton Steel Plant and hard chromium plating at the Nutmeg Chrome Corp. Films were supplemented by a talk on hard chromium plating.

Other speakers included Chicago Branch President J. M. Andrus, chief chemist of Croname, Inc., who talked on "Paint Finishing of Plated Surfaces," and J. G. Seiter, of the F. J. Stokes Machine Co., who presented "Vacuum Metalizing."

Dr. George P. Swift, National President and President of the Swift Electrochemical and Spectrochemical Laboratories, served as Session Chairman.

The hard-working Tri-State Regional Meeting Committee which produced this successful venture is as follows: Chairman, W. Wilson Loveless; Cochairmen, D. L. Taylor, A. R. Waters; Secretary, William Young; R. Jager, Columbus; W. F. Drake, Louisville; Educational Program, R. K. Rarick, R. A. Barry, R. D. Miller and C. H. Truman; Hotel, D. L. Taylor and E. Roof; Finance and Tickets, G. T. Speers, C. R. Sorber and R. K. Evans; Publicity, E. A. Blount, C. Wise and A. R. Waters; Entertainment, C. Wise and S. Chipman; and Favors, W. E. Gordon.

In attendance, also, were National Past President William J. Neill of Columbus who invited members and guests to the 2nd Tri-State Regional Meeting, scheduled to be held in Columbus next year; National Executive Secretary of the AES and Managing Editor of PLATING, P. Peter Kovatis of Newark; and candidate for the office of National Third Vice-President, Tom Evans of Indianapolis.

Research Task Committee on Microthrowing Power

Myron Diggin of the Hanson-Van Winkle-Munning Co., Matawan, N. J., is the newly appointed Chairman of the Society's research task committee on microthrowing power. The selection was announced recently by AES Research Committee Chairman E. J. Serfass. Assisting Diggin on the task group are W. R. Meyer, Enthone, Inc., New Haven, Conn.; H. J. Read, Penn State University, State College, Pa.; and E. R. Bowerman, Sylvania Electric Products Inc.

The

BEGINNING of GOOD PLATING

UNEVEN corrosion and release of foreign matter and excessive "sludge" militate against, often prevent, formation of an even, integrated plate of good color. Such "little foxes" are more or less traceable to imperfect grain structure in the anode. Seymour "Controlled Grain" Nickel Anodes give even deposit because the grain is homogeneous. To attain this, virgin nickel is melted in modern electric furnaces and poured under accurate analytical and pyrometric control. As a result, Seymour Anodes corrode evenly, eliminating many a plater's headache!

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NICKEL ANODES

The Seymour Manufacturing Company, Seymour, Conn.

Branch News

Coming Events

NEW ENGLAND REGIONAL MEETING

HARTFORD, NEW HAVEN, SPRINGFIELD and WATERBURY BRANCHES
To be held at Bond Hotel, Hartford, Conn., Saturday, May 15, 1954
Technical Session 2:00–5:00 P. M.
Dinner at 7:00 P. M.

SPEAKERS PROGRAM

DR. ABNER BRENNER, Chief of Electrodeposition Section, National Bureau of Standards, "Current Status of Electroless Nickel Plating"

DR. WILFRED ROTH, Treasurer and Director of Research, Ultra Viscoson Corp., "Ultrasonics as Applied to Metal Finishing"

EZRA BLOUNT, Editor of PRODUCTS FINISHING, subject to be announced.

ALLENTOWN-READING BRANCH

The February 17th meeting was held at Scotty's Anchorage, Emmaus, Pa., with the usual fine dinner starting at 7:00 P.M.

Speaker for the evening was EDWIN OTTENS of the Philco Corp. Ottens' subject was "Zinc Plating."

The nominating committee presented the names of the members that they had chosen to nominate for branch officers for the new term of 1954–1955.

JOSEPH E. MCKEONE, *Librarian*

BALTIMORE-WASHINGTON BRANCH

On Saturday, March 13, 1954, the branch held its annual educational session, banquet and dance in the Caswell Room of the Lord Baltimore Hotel, Baltimore, Md.

During the afternoon session, excellent technical talks were presented by H. HEAD on "Aluminum Anodizing," by RICHARD SALTONSTALL on "Nickel Plating" and by MYRON DIGGIN on "Unusual Plating Problems and Their Solution."

Following the banquet, guest of honor, SUPREME PRESIDENT DR. G. P. SWIFT was inducted into the Order of the Pot by PAST PRESIDENT KEN HUSTON.

Included along with Dr. Swift in the list of guests were MRS. SWIFT, AES EXECUTIVE SECRETARY P. PETER KOVATIS, and Research Committee members, DR. WILLIAM BLUM, DR. E. PARKER, Myron Diggin and E. R. BOWERMAN.

CARL THIEDE, *Secretary*

BOSTON BRANCH

The branch met on January 7 at the Hotel Statler with PRESIDENT SHAPIRO in charge.

One new member was elected. It was voted to continue the same delegates for the 1954 National Meetings and DR. NARCUS was instructed to have roast beef as the main course for the Boston Annual Banquet on May 1.

HOWARD WARDELL then introduced R. W. LANGDON of the General American Transportation Co. of Chicago, Ill., who discussed "The Kanigen Process" in some detail.

This process for depositing nickel without the use of electric current is a development from the basic work originating at the NBS. It is now available as a continuous process to deposit a thickness of 0.001 to 0.0012 inch per hour. Composition of the deposit approximates 93 per cent nickel and 7 per cent phosphorus. It is competitive with electroplated deposits only if deposits of 0.001 inch or more are necessary. It cannot compete with decorative plating.

At the February 4 meeting, three applications for membership were approved and voted. Dr. Narcus announced that everything was progressing smoothly for the annual meeting but no papers were received for the prize contest. Convention registration fees for separate items were discussed as well as a lower fee for children.

Secretary Swift then introduced JOHN A. SWIFT of the Swift Industrial Chemical Co. of Canton, Conn., who discussed "What the Plater Should Know About Metallurgy." His talk started with a discussion of hardness testing by Brinnell,

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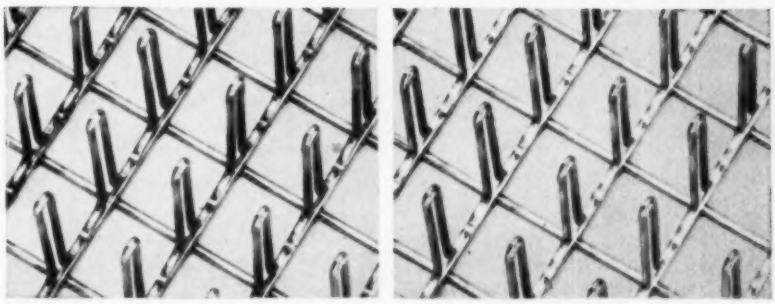
The 1954 way to chromium plate

Many former operating difficulties eliminated with Unichrome SRHS Solution . . . users verify various benefits



(Left): Photograph of dish drainer basket plated in ordinary chromium solution. Dark areas at base of wire fingers show no coverage of nickel.

(Right): Same product when plated in SRHS Chromium Solution. Note the even color at top and base of finger – evidence of complete coverage.

More than 700 commercial installations of the Unichrome SRHS Chromium Solution are now in operation. These have provided working demonstrations that ordinary chromium solutions, unchanged since development in 1925, are virtually obsolete.

Briefly, the striking improvements stem from several important characteristics of the SRHS bath. Namely, its higher cathode efficiencies; its self-regulation of important chemical constituents which helps maintain optimum plating balance; and its wider bright plate range. These have benefited platers in various ways. For example:

20% to 80% FASTER PLATING

With an SRHS Solution, one plater was able to speed up an automatic machine. Plating work in 2 minutes 25 seconds instead of 3 minutes 38 seconds, he not only increased the machine's capacity 33% but also improved quality by exceeding thickness specifications.

Another company needed additional tanks to handle increased production of plated cutlery. Just by using the SRHS Solution, existing capacity was stepped up and the expense of new equipment saved.

BETTER COVERAGE

Photographs above show wire baskets used in dishwashers. Ordinary chromium couldn't cover this complicated shape but the SRHS Solution plated the work completely.

The solution has wider bright plate range. SRHS Chromium, therefore, not only means less "missing" but also less "burning." Consequently, it assures fewer rejects.

MORE WORK WITH LESS CURRENT

Finishing automobile bumpers, one company could plate only 8 on a rack in the ordinary solution. Requiring less current, SRHS Chromium permitted plating 9 bumpers per rack – or an 11% increase in production with no change in equipment.

A plant plating cigarette lighters in the ordinary solution was behind schedule due to limited current. Switching to SRHS Chromium, they found it possible to plate the same work load with ⅓ less current and in ½ the time.

SELF REGULATION SIMPLIFIES PROCEDURE

A printing company installed an SRHS Solution for chromium plating rotogravure cylinders. They had no previous chromium plating experience. Despite this lack, the SRHS Bath enabled them to plate 2800 cylinders with only 5 rejects.

★ ★ ★

With results like these, it no longer pays to work with a chromium solution of the "1925 vintage." Learn how to convert your plating operation without disrupting production. Detailed technical information available. Or call in a United Chromium engineer for complete facts.

WHAT PLATERS LOOK FOR IN RECTIFIERS

All platers want a DC supply to be dependable, equipment durable, and capacity close to needs in order to avoid extra investment.

Designed specifically for platers, in a line unsurpassed for completeness, Unichrome Rectifiers permit virtually a "custom" rectifier installation. Included are standard units, plus-rated units, extra heavy duty units and water-cooled units –available in sizes from 250 to 10,000 amperes in 250 ampere steps and with various controls. Full data available.

What to look for in chromium plating anodes

Quality of chromium plating anodes can be gauged by several important factors.

First is composition of the anode. If it's tin-lead alloy, it better resists corrosive action of chromic acid during both idle and active periods.

Then check the bond between body and copper hooks. Best conductivity results when hooks are tinned, alloy cast to the hook, and anode body then fused on.

Finally, observe the hook. Does it assure good contact with a knife-edge wedge-type hook that cuts through encrustations on anode bars?

Providing users with all these advantages, Unichrome Anodes for chromium plating make for efficient service with unusual economy.

Tantalum coils reduce costs in acid plating baths

More and more plating plants are now reaping benefits from a metal that seems made to order for heating or cooling acid solutions. With Unichrome tantalum coils, they get equipment immune to all commonly used acid plating baths. The metal has high heat conductivity and resistance to thermal shock. Its corrosion resistance and hardness permit use of thin wall sections to further increase its good heat transfer.

Result: A smaller coil does a better job than bulkier coils made of other materials–and with a minimum of trouble and maintenance. This saves on replacement and loss of production during downtime. Write for literature.

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Branch News

Rockwell and Tukon testers, tensile tests and progressed into a consideration of alloys and microstructures. The various types of carbon steels—such as hot and cold rolled and methods of processing by open hearth, electric and Bessemer furnaces—were discussed together with the manner in which impurities were introduced to give later finishing troubles. Methods of finishing steel in the mills were discussed in relation to trouble in final decorative finishing.

At the March 4 meeting, MANSON GLOVER reported on the interim meeting at Toronto and on the entertainment for the annual banquet. Secretary Swift reported on the educational session for the afternoon of Saturday, May 1, 1954 as completed. The motion by Harold Narcus, seconded by ELSTON FLORES that the Board of Managers be requested to investigate the possibility of having business meetings on some other day than the regular monthly educational meeting and present their findings at the April meeting, was passed.

ALAN CHABOT of Detrex Corp. then was presented. He discussed "Cleaning by Sound" and explained how a barium titanate crystal was used to generate the sound, the use of a trough transducer, electrical connections, surface protection, action of the liquid, frequency, size, construction and method of operation of the unit. Slides were used to amplify the talk which was followed by demonstration using a laboratory unit.

GEORGE P. SWIFT, *Secretary*

BUFFALO BRANCH

At the meeting of February 5th, JACK WINTERS, Technical Director of R. O. Hull Co., Inc., of Rocky River, Ohio, gave an illustrated lecture on "Tuning Up for Plating."

He noted that the present tendency in all industry today and most particularly in plating is to get by and adapt the job to include the problem instead of correcting the problem.

In plating there are several fundamental problems. First, the plater must take the part with the surface condition as received and must change that to one which is usable to apply the metal deposit. Second, the electrochemical effects in the plating bath itself.

The most common problems were, in Mr. Winters' opinion, as follows:

1. Over preparation of surface in cleaning. Attack of metal by acid to leave smut of precipitated carbon on steel is one example of this. As an illustration, he suggested using 3 cup-shaped cathodes made of steel, copper and carbon and noticing the difference in throwing ability in the recesses. As a means of preventing smut, he recommended using either an inhibited acid or an alkaline derusting compound.
2. Possible faults in the electrical system. Uniform current distribution is important to good plated deposits.
3. Bipolar effect of unlined steel tanks. He recommended using glass or rubber panels on the sides and ends of tanks and brick on the bottom.
4. Chemical analysis of baths. He recommended that baths be analyzed at frequent intervals by empirical methods and that critical check analyses be made once a month. He added, "Never adjust a bath without an analysis first—do not fiddle with baths."

He then screened color slides to show the effect of addition agents to plating baths when plated in a "Hull" cell.

ERIC G. SAMPSON, JR., *Secretary*

BUFFALO BRANCH

The branch meeting on March 5 at the Hotel Markeen was called to order at 8:15 by PRESIDENT MONEYPENNY with 50 members present. A report on the interim meeting was given. The delegates praised the hospitality the Toronto Branch had given them.

A committee was appointed for the picnic to be held August 14 at the Auto Club at Clarence, N. Y., the site of the 1951 National Convention picnic. LIBRARIAN R. HOFFMAN was appointed chairman of the Educational Session to be held October 2, 1954 at the Markeen Hotel.

The librarian then introduced DR. BROWN, Research Director of The Udylite Corp., who spoke on "Corrosion of Various Plated Electrodeposits."

A lively discussion followed this very interesting paper.

B. KIRCHHOFF,
Publicity Chairman

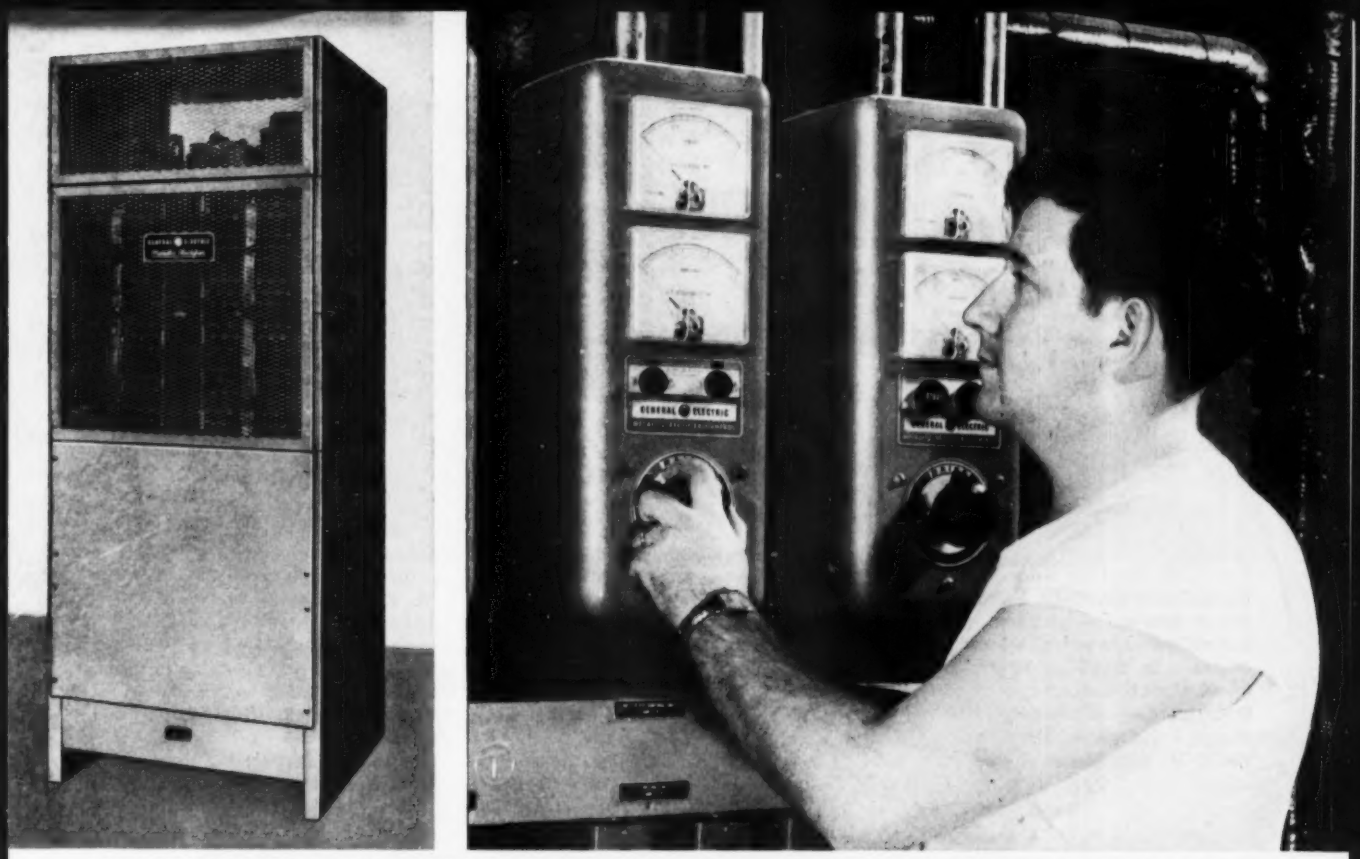
CHICAGO BRANCH

On March 12 the branch scored another success in a joint meeting with the Chicago Section of the Electrochemical Society, held under the auspices of Chicago Branch.

A substantial number of members from both organizations gathered at the Western Society of Engineers to hear DR. M. L. HOLT, Professor of Chemistry at the University of Wisconsin, speak on the electrodeposition of alloys of the less common metals.

Before the technical meeting, it was announced that H. A. GILBERTSON, one of the charter members of Chicago Branch, was hospitalized recently. The entire branch extends its wishes for a speedy recovery to Mr. Gilbertson.

Then the very important business of the election of officers took place. The following slate, submitted by the nominating committee, was voted unanimously into office:



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Once you have set the voltage or current on an automatically regulated General Electric Plating Power Supply, no further adjustments are needed. Automatic regulation maintains your setting within ±2 per cent, regardless of variations in line voltage or tank load. Equipment is available to automatically regulate voltage or current, or both.

SAVINGS—Automatic regulation saves you money several ways. There is no need to check and adjust current or voltage. By eliminating human error, it assures work of more uniform quality. It facilitates continuous production without expensive shutdowns for maintenance or adjustments. Finally, it greatly reduces your rejects caused by current or voltage variations.

FLEXIBLE — Automatic regulation will maintain any setting between 16 and 100 per cent of rated voltage, or 10 and 100 per cent of rated current. It is available as an integral part of G-E plating power supplies, or can be added later to manually controlled units.

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Branch News

President—Edward Stanek
1st Vice-President—Simon P. Gary, Jr.
2nd Vice-President—Ralph Pettit
Secretary-Treasurer—Paul Glab
Librarian—Dr. Russell Harr
Delegates—Clyde Kelly, Paul Glab, Edward Stanek
Alternate Delegates—Joseph M. Andrus, Raymond F. Ledford, H. A. Gilbertson
Board of Managers—Joseph M. Andrus, Ovide Bedard, William H. Murphy

After the election, Dr. Holt gave his talk on the deposition of alloys of the less common metals. Dr. Holt discussed the elements in groups IV b, V b, VI b, and VII b. He listed the baths used for the deposition of alloys of cobalt and molybdenum, iron and molybdenum, chromium and molybdenum and nickel and molybdenum. In depositing these alloys he found that best results were obtained through the use of citrates and tartrates as complexing agents. Dr. Holt discussed the Ni-Mo bath in some detail.

Jerome Kuderna,
Publicity Chairman

CINCINNATI BRANCH

President C. Truman opened the meeting at 8:45 P.M. with 36 members and guests present. During the routine business meeting, Librarian Rarick announced that the next meeting would consist of an open discussion on plating conducted by a panel of four members, namely: Edwin Roof, William B. Stephenson, Lester Helmich and John Magly.

The following delegates and alternates were appointed to represent the branch for 1954: Delegates: Ezra Blount, L. A. Critchfield and Bill Young. Alternates: Wm. D. Gordon, Ray Barry and R. D. Miller.

Blount, Helmich and Aubrey Holt were appointed as a nominating committee to nominate officers for the election to be held in April, 1954.

Wise's motion that Cincinnati try to become the host branch for the National Convention in 1958 or later was approved.

Dr. Roy O. McDuffie was introduced as the speaker of the evening. McDuffie gave a very interesting talk, augmented by slides, on the "Fundamentals of Electroplating."

The meeting adjourned at 10:00 P.M. The social hour following the meeting was sponsored by The Chipman Supply Co.

William Young, *Secretary*

CINCINNATI BRANCH

President C. Truman called the February 24 meeting to order at 7:45 P. M. with 43 members and guests present.

Photo courtesy Products Finishing

Speakers and some of the officers pictured at the Dayton annual meeting, left to right: R. O. Hull, Alan R. Burman, William J. Neill, Richard M. Clinehens, J. C. Harris and Holle Luechauer

Roy Critchfield reported on the Toronto interim meeting. He also reported that he announced the intention of the Cincinnati Branch to get the National Convention for 1958 or as soon as possible thereafter. He suggested that Cincinnati form an active committee to advertise and promote the 1958 Convention for Cincinnati.

Ezra Blount, in reporting on the interim meeting in Toronto, gave the following methods used by some of the other Branches to increase their attendance:

(1) Place names of those present in a bowl and draw a name for a $5.00 prize.
(2) Exhibit Society publications at the meetings to remind members and visitors of the work being done by the AES.
(3) Increase the number of branch workers.
(4) Arrange special programs in conjunction with some of the meetings; for example, a Past Presidents' Night.

The business session was adjourned and the panel talks were started by Truman's introduction of the first speaker, Lester Helmich, who spoke on "Chromium Plating on Steel and Aluminum Aircraft Parts and Chromium Plating for Tool Salvage." Helmich devoted most of his talk to hard chromium plating on aluminum, but mentioned the value of hard chromium in salvaging tools and gauges.

Mr. Magly spoke on "Gold Plating on Electropolished Steel and Silver Plating Copper Powder." To point out the unusual problems that arise in the plating room, Magly discussed silver plating copper powder, and decorative chromium plating directly on electropolished stainless steel.

Ed Roof talked on the subject of "Zinc Barrel Plating-Cycle Plating in Lucite Barrels." He discussed loading of the plating barrels, cleaning cycle for use with Lucite barrels, the cooling of the plating solutions, and other phases of barrel line operations such as, rinsing, pickling and posttreatment dips. Roof showed color movies to illustrate his talk.

W. B. Stephenson, Jr., chose for his subject, "Automatic Anodizing, Production and Experimental Plating." Besides discussing automatic anodizing in detail, Stevenson mentioned copper plating for heat-treat stop off, silver plating, and electroless nickel.

The social hour following the meeting was sponsored by Herbert Chemical Co. and Pennsylvania Salt Manufacturing Co.

William Young, *Secretary*

CLEVELAND BRANCH

Due to a severe snowstorm during the first week in March, the attendance at the March 5 meeting was smaller than usual. Those members who did brave the snow to attend the meeting were rewarded by a very interesting talk by Karl Jund of the Globe Chemical Co. Jund's talk covered his experiences on electropolishing of basis metals and deposits and also newer developments in tin-copper alloy deposits. The interest of the audience was shown by the long discussion period that followed his talk.

A. H. Du Rose, *Publicity*

DAYTON BRANCH

On February 27 the branch held its 9th Annual Educational Session and Dinner-Dance at the Dayton Biltmore Hotel. Sixty members and guests attended the educational session which was presided over by Chairman Bill Neill, past president of the Supreme Society. J. C. Harris, Assistant Director of Research, Central Research Dept., Monsanto Chemical Corp., discussed "Tests for the Determination of Metal Cleanliness," A. R. Burman, Cro-Plate Co., Inc., discussed "Wet Pressure Blasting," and R. O. Hull, R. O. Hull Co., Inc., discussed "Tuning Up for Production."

The dinner was attended by 425 members and guests. Each lady present received a billfold as a favor. After-dinner entertainment was provided.

Social Chairman Ray Coy and his committee earned the praise of all present

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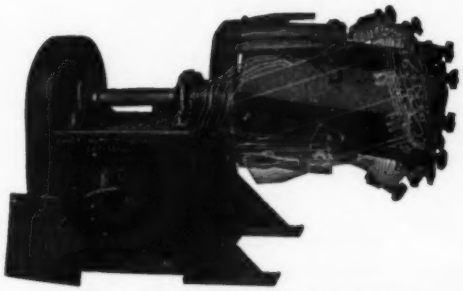

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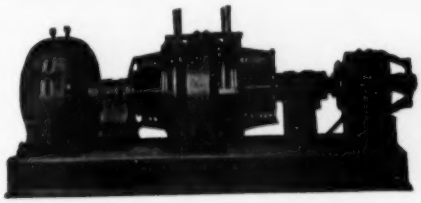

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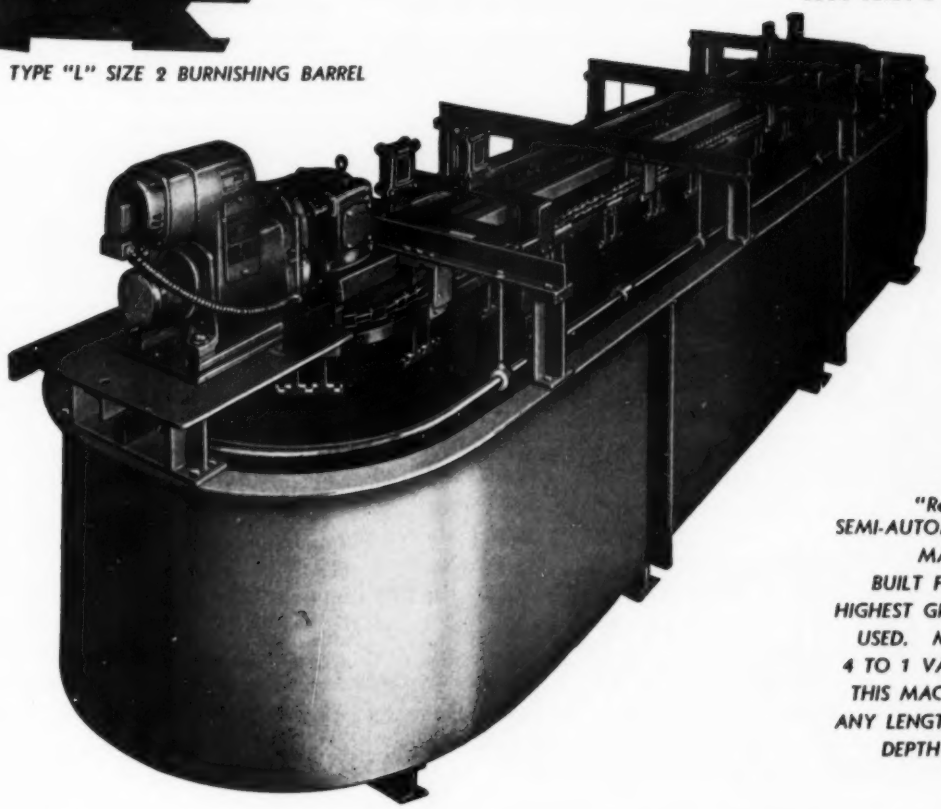

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as a result of the smoothness with which this year's party proceeded.

The regular March meeting of the branch was called to order by PRESIDENT DICK CLINEHENS on March 11 at the Dayton Biltmore with 29 members present. EMORY C. GUERIN of the Guerin Plating Co. was voted membership in the Dayton Branch. LIBRARIAN HOLLE LUECHAUER introduced F. T. EDDY, Assistant Plant Superintendent of the Manufacturing Division of the Chase Brass and Copper Co., Waterbury, Conn. Eddy, president of the Waterbury Branch, discussed "Plating Room Organization."

Following the meeting refreshments were served, courtesy of ART GERADA and the Udylite Corp.

JOHN EASTON, *Secretary*

DETROIT BRANCH

The branch held its second Annual Ladies' Night at the Hotel Statler on March 5.

PRESIDENT L. C. BORCHERT called the meeting to order at 8:30 P. M. with about 200 members, wives, and guests present. Honored guests were ALAN A. PEARSON, Morris Motors, Ltd., Oxford, England, and J. A. BECHTOLD, M. L. Aikan, Ltd., Middlesex, England.

The total membership of the branch is now over 600 members, record for the branch and Society. Eighteen new members augmented this. JOE GURSKI thanked the members for their assistance in the membership drive.

WALTER PINNER, Houdaille-Hershey Corp., then was introduced as the principal speaker for the evening. In discussing his subject, "Vacation in Mexico," he showed approximately 275 color slides taken by himself while he and his wife vacationed there last year. Beautiful scenery and points of interest in Mexico City, Acapulco, Monterrey and other cities were seen by a very attentive audience.

Sociability followed the meeting with the serving of refreshments.

E. J. KUBIS,
Assistant Secretary-Treasurer

HARTFORD BRANCH

A regular meeting was held at the Bond Hotel on February 15 with about 85 members and guests present. Preceding the meeting, a color movie, "The Story of Research," was shown through the courtesy of the DuPont Co.

Guest speaker for the evening was WILLIAM F. CAHILL of the F. Cahill Co., Providence, R. I., whose subject was "Electroless Nickel Plating."

He described the composition of the bath which is based on the pioneering work of the NBS. This bath now in use consists of nickel chloride, sodium hypophosphite and a complexing agent, sodium glycolate. Various tests were described where other complexing agents were tried with unfavorable results. Nickel may be plated out at 0.0008 inch per hour at a temperature of 190° F to 195° F in a uniform deposit especially in places of poor metal distribution such as in the bores of tubing. Nickel metal content and the *p*H are controlled carefully and porcelain or cobalt-glass lined tanks are used.

The technical chairman for the evening was WALTER ACKER.

STANLEY PLATOZ, *Secretary*

INDIANAPOLIS BRANCH

On February 3, 31 members met at the Fox Steak House at 6:30 P.M. for a steak dinner. An additional 8 members came for the program at 8:00 P.M. ABRAHAM MAX presided and asked for introductions after which followed the reports of the Secretary and Treasurer.

MARSHALL WHITEHURST reported on the annual dinner-dance of May 15 at the Indianapolis Athletic Club. EDWARD BRUCK is in charge of the tickets which are on sale now.

The program of the evening was given by WALTER BINAI, branch member, who recently returned from a three-months' trip to Thailand. Binai told of the trip by plane from Indianapolis. The flight stopped at Newfoundland, British Isles, Europe, Africa and then his destination. This was the first visit to his native land since he left in 1920. His twin brother is minister of finance of Thailand. Binai told of the customs, living conditions, weather, and many points of interest. He showed many color slides of the trip and everyone was very interested. Binai made one statement at the end of his talk which is all too true. He said that when the

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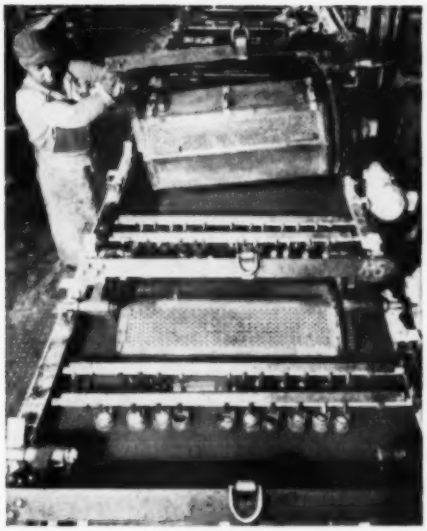

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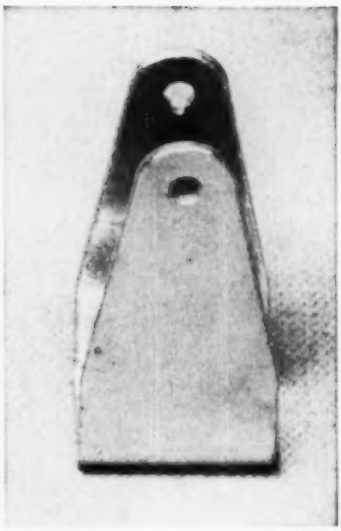

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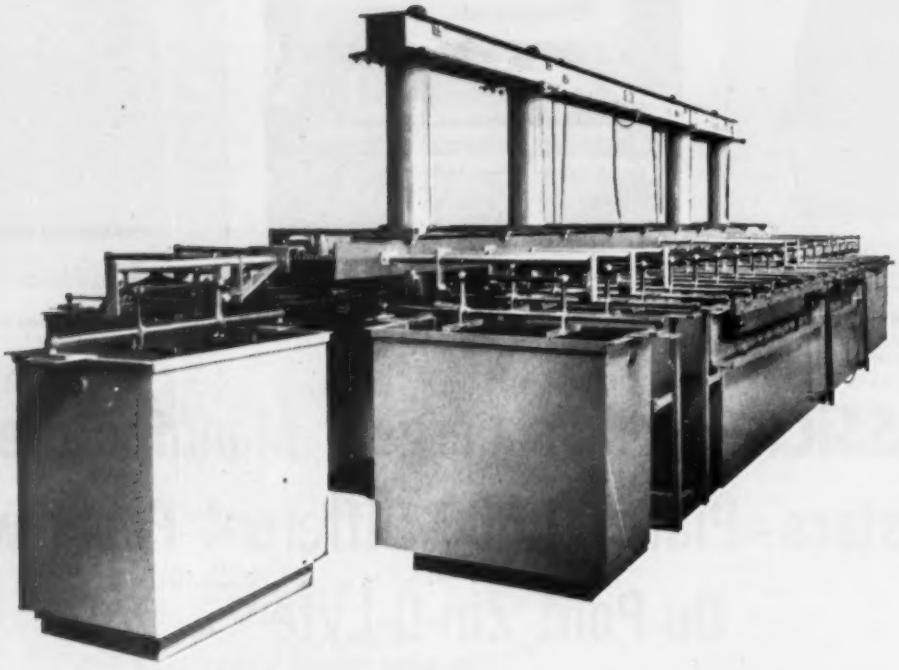

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Branch News

plane landed at the local airport, he was the happiest person on earth to be back in the U. S., "the Shangri-La" of the world.

EDNA ROHRABAUGH, *Secretary*

JACKSON-LANSING BRANCH

The branch held a regular meeting at the Hotel Porter, Lansing, Mich., on February 9. The occasion was the third annual Ladies' Night. An excellent group attended, and participated in a very satisfying prime ribs of beef dinner followed by entertainment.

The entertainers, whose amateur standing would rate well on a professional scale, were very well received. Gifts for both ladies and men put a pleasing finishing touch to the evening. Sincere thanks and appreciation for the many individuals and firms for the support provided is expressed by the Branch.

R. W. REDMOND, *Publicity*

LOS ANGELES BRANCH

A regular monthly meeting was held at Rodger Young Auditorium on February 10 with 102 members and guests in attendance. Six new applicants for membership were introduced and 6 new members were installed into membership.

The election of officers was conducted by the nominating committee chairman, WALTER BEHLENDORF. The elected officers for 1954–1955 are:

President—G. STUART KRENTEL
1st Vice-President—EARL W. ARNOLD
2nd Vice-President—L. TRUMAN STONER
Secretary—NORMAN K. MCEWAN
Treasurer—GEORGE MAGUREAN
Librarian—GEORGE J. HETZ
Board of Managers—JOHN D. MILLHORN, MYRON ORBAUGH, ROY LOSTUTTER

The librarian next introduced the speaker, ALAN R. BURMAN, of the Cro-Plate Co., Inc. His subject was "Pressure Blast—a New Metal Finishing Method."

Burman discussed the application of pressure blasting to the finishing of metal parts prior to plating. In pressure blasting he stressed it was of utmost importance to select the proper abrasives to be applied at a regular velocity or at high velocity of operation to obtain the maximum results. A question and answer period followed, and the meeting was adjourned at 10:00 P.M.

L. TRUMAN STONER, *Secretary*

LOS ANGELES BRANCH

A regular monthly meeting was held at the Rodger Young Auditorium, March 10, 1954.

There were 95 in attendance and 11 new members were installed into membership. VICE-PRESIDENT STUART KRENTEL awarded the prizes to the winners of the membership drive, first prize to LAWRENCE O'NEILL and second prize to TONY STABILE.

The nominations and election of delegates to the National Convention in New York were held at this meeting. They are: WILLIAM D. HOURIGAN, EARL W. ARNOLD, JACK F. BEALL and Alternates: DON M. BEDWELL, FRED L. WEISS, JOHN MAZZOTTI.

Vice-President Earl Arnold was selected as session chairman at one of the educational sessions at the New York Convention.

The featured speaker of the evening, F. G. SCHROEDER of the Electric Products Co., Cleveland, Ohio, discussed the application, use and maintenance of rectifiers and motor generator sets for all electrolytic processes. A few of the points discussed and evaluated in selection of a power source were: installation cost, initial cost, operating efficiency, voltage regulation, power factor, flexibility.

From left to right:—Dr. Henry Brown, Udylite Corporation, Robert Bailey, Beckman Instruments, Inc., two of the speakers at the Los Angeles Branch Educational Session, and George Magurean, Chairman of the Technical Session

Newly elected President Stuart Krentel appointed Tony Stabile as Research Committee Chairman and HAROLD WANAMAKER as Sergeant-at-Arms.

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The 24th annual educational session and dinner-dance was held Saturday, March 20, 1954 at the Ambassador Hotel. Despite the early morning shower, a record attendance of 173 assembled for the educational session. The speakers were: ROBERT A. BAILEY, Beckman Instruments, Inc., South Pasadena, Calif. who discussed "Instrumentation in the Plating Industry"; DR. HENRY BROWN, Udylite Corp., Detroit, Mich. who talked on "The Role of Various Surface Active Agents in Electroplating Baths"; ROBERT W. COUCH, United Chromium, Inc., Detroit, Mich., who told of "Recent Developments in Chromium Plating"; and MYRON B. DIGGIN, Hanson-Van Winkle-Munning Co., Matawan, N. J., who cited "Helpful Hints on Unusual Plating Problems."

The Good Fellowship Luncheon was held in the world-famous Cocoanut Grove, with WALTER BEHLENDORF as toastmaster. A number of useful door prizes were given away to the holder of lucky tickets and the usual story-telling contest was won by Lawrence O'Neill with C. McLAREN winning second place.

To complete a most interesting day, the annual dinner-dance was held in the famous Embassy Room of the Ambassador Hotel. There was a lovely compact and cigarette case as favors for all the ladies and dozens of door prizes for the holders of lucky tickets. The 4th annual waltz contest emceed by JOHNNY MILLHORN was won by MRS. MILTON CROMPTON and MARTY SMITH.

L. TRUMAN STONER, *Secretary*

†RICHARD G. HERBST, 61, died of chronic leukemia-bronchial pneumonia on March 19 in the Veterans' Administration Hospital at Sawtelle, Calif.

"Dick," as he was known to most of the old-time platers in Los Angeles, had been ill for the past six years.

He leaves his wife, Rene; son, Richard, Jr., 14; daughter, Laurene, 8; and sister, Mrs. Margaret Ball; all of Santa Barbara, Calif., in which city he operated the Herbst Plating Works for the past 26 years.

Shortly after the AES Los Angeles Branch was formed, Dick joined and had been an active member until his passing.

He was born in Detroit, Mich., on September 24, 1892, and served in the first World War, being a member of the Santa Barbara Post, American Legion.

MELBOURNE BRANCH

The 9th Annual Meeting of the branch was held on February 18 at the Melbourne Technical College.

Following adoption of auditor's report and balance sheet and the acceptance of a new member, the retiring president, GLEN WALKER, reviewed the activities of the branch over the past year.

Robert Couch, United Chromium Incorporated, Myron B. Diggin, Hanson-Van Winkle-Munning Corp.

The election of officers for the year ending 1954 resulted as follows:

President—J. N. PARKER
1st Vice-President—P. TIKOTIN
2nd Vice-President—H. M. MERTON
Immediate Past President—G. WALKER
Secretary-Treasurer—To be selected
Librarian—H. TEAGUE
Board of Managers—J. J. DALE, S. B. PEARCE, B. JOHNSTON

Speaker for the evening, H. R. DAVIES, Assistant Chief Development Engineer, Commonwealth Aircraft Corp., was introduced by J. N. Parker.

Davies gave an address on "Jet Engines," using terms of simplicity for the audience, gave details of the gas turbine engine, its principles, continuous power, pounds thrust, etc.

Advantages of jet to piston engines were compared, and fuel consumption costs were discussed.

Interesting slides were screened, showing manufacture of aircraft parts at C.A.C. factory, giving an idea of tremendous tooling efforts behind mass production of aircraft.

S. B. PEARCE,
Acting Secretary-Treasurer

NEW YORK BRANCH

The February 26 meeting held at the Hotel Statler, N. Y., was called to order by PRESIDENT ANGELO AMATORE, who had the pleasure of announcing the presence of the following officers of the National Society: PRESIDENT G. P. SWIFT, EXECUTIVE SECRETARY P. PETER KOVATIS, PAST PRESIDENT F. J. MACSTOKER and of the following out-of-towners: DR. D. GARDNER FOULKE and DR. E. PARKER.

President Amatore announced that the nominations for the coming year would be tabled until the March 12 meeting at which time both the nominations and voting for the officers of the coming year will be held.

LIBRARIAN P. VEIT presented D. HARTSHORN, JR., of the Enthone Co., Inc., who spoke on "Base Metals."

At the March 12 meeting the following men were elected to membership and duly installed: R. WILLIAMS, L. BOCCIE,

L. Bricker, S. Yank, J. Curch, I. Simmons, A. Galfunt, C. Morla, Jr.

The following transfers were read and accepted by this branch: S. Geffon (Newark), E. Quinlon (Detroit).

The next order of business was nominations and election of officers for this branch for the coming year.

G. Herrmann made a motion that the present officers be carried on for the coming year, with one exception, that being M. Nadel, member of the Board of Managers, whose term expires. Herrmann's reason for the motion was that he thought it wise to carry the present board over due to the National Convention being held in New York City this year. Nadel seconded the motion. It was presented to the membership and duly carried.

Nadel nominated F. MacStoker as member on the Board of Managers; nominations were closed and Schore again cast one vote for MacStoker.

The meeting was turned over to the Librarian, P. Veit, who, in turn, presented a "Question and Answer" period.

Lester Levinson, *Recording Secretary*

PHILADELPHIA BRANCH

The regular meeting was held at the Franklin Institute on February 26; about 50 attended. Seven new active members were admitted; three applications were received. The nominating committee presented a slate of candidates for the 1954-1955 term of office, to be voted on at the March meeting. President Ottens announced Edward Hoffmann as chairman of the Welfare Committee, he to select a committee of three. The secretary read announcements received of other branches' activities. He also gave a report on the business transacted at the Toronto interim meeting.

Arthur Kohler, Frederick Gumm Chemical Co., spoke on "Barrel Burring." He defined the three basic ways of removing burrs as: chipping—the burr breaks off in one piece; grinding—the burr is worn away in a fine powder; and flowing—no metal is removed, the sharp edges are rounded.

Explained were the various types of barrels and the action that takes place in each: horizontal, tubbing or submerged, oblique, bottleneck. He described the construction of various size barrels, the various types and sizes of burring media and their general uses. Slides were used to illustrate the points discussed.

The talk concluded at 9:45 when the meeting recessed to the Dairy Dell, where coffee and Danish pastry were served through the courtesy of Pennsalt Co.

I. William Marcovitch, *Secretary*

PITTSBURGH BRANCH

A monthly meeting was held at the Sheraton Hotel on January 6.

The application of D. M. McMahon was received for membership.

Librarian Myron Ceresa introduced the speaker of the evening, K. M. Watson, General Electric Co., who spoke on "Plating Room Waste Disposal."

At the February 3 meeting held at the Sheraton Hotel, Treasurer McHattie; Annual Banquet Chairman Harry Flister; and Nomination Committee Chairman Rex Goldbach presented their reports.

D. M. McMahon was elected to branch membership. Librarian Ceresa introduced Cleve F. Nixon, Head of Electrochemistry Dept., Research Laboratories Division of General Motors Corp., as the speaker of the evening. Nixon's subject, one of extreme interest and illustrated with slides, was "Automotive Decorative Plated Finishes."

A very interesting phase of Nixon's talk centered about the quality of decorative plating.

At the March 3 meeting applications of Louis Pavilsh, Armand C. Morgan and Richard E. Woehrle were received for membership. Guest speaker, Myron B. Diggin, reviewed the interim meeting held in Canada.

Harry Flister, annual banquet chairman, reported on the progress his committee had made. The affair this year will be held at the Schenley Hotel on May 1, 1954. Twelve members were suspended for delinquent dues.

The annual election of officers took place with the following elected to office:

President—Bob Varner
1st Vice-President—Rudy Schindler
2nd Vice-President—Myron Ceresa
Librarian—Fred Dixon
Secretary—Herb Schramm
Treasurer—Carl McHattie
Delegates—Ed Washburn, Ed Smith, Bob Woofter
Alternates—Myron Ceresa, Bob Varner, L. E. Lancy

Myron B. Diggin, Technical Director of Hanson-Van Winkle-Munning Co., presented a very interesting topic. He spoke on "Helpful Hints in Solving Unusual Plating Problems."

W. D. Wilson, *Secretary*

PORTLAND BRANCH

A meeting was held February 15 with 16 members and guests present. The following members were elected to branch offices:

President—H. R. Finzer, East Side Plating Works
Vice-President—Harold Burkitt, Industrial Chrome Plating Works
Secretary-Treasurer—Ken Humphrey, L. H. Butcher Co.

The branch was pleased to have as guest speaker Alan Burman of Cro-Plate Co., Inc., who gave a very informative talk on wet blasting. This was followed by a general question and answer period.

Ken Humphrey, *Secretary-Treasurer*

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PROVIDENCE-ATTLEBORO BRANCH

The February 15 meeting was held at the Providence Engineering Hall with 47 members and guests present.

THOMAS LAWRENCE, Chemist at Coro, Inc., was elected to membership.

A. D. CHABOT, New England Manager for Detrex Corp., was introduced as guest speaker of the evening by PRESIDENT GEORGE GIBBS. The subject, "Cleaning by Sound," was described in great detail and the talk was augmented by color slides and demonstration.

In this outstanding new process, Detrex has augmented the well-known high solvent properties of trichlorethylene and other solvents with agitation which is a result of ultrasonic energy moving through an elastic medium (trichlorethylene). The result is a direct impact upon the overall surface of a submerged piece of work affording a cleaning action previously unobtainable except by hand wiping.

To apply this form of energy in the process, a special transducer is immersed in the liquid to begin ultrasonic energy at the part to be cleaned.

The barium titanate transducer, chosen because of its many desirable electrical and mechanical properties, is driven by a radio frequency generator at a frequency of 200 to 450 kc, depending upon the dimension of the transducer.

The generator incorporates a bridge type rectifier using mercury vapor tubes, power oscillator, tuned circuits and necessary controls and protective devices. The tube filaments and control circuits are energized through transformers off the main line.

HENRY SHAVIER, *Secretary*

ROCHESTER BRANCH

In lieu of the regular business meeting, the branch participated in a joint dinner-speaker evening held in conjunction with the Rochester branches of the American Foundrymen's Society, the American Welding Society, and the American Society of Metals at the Chamber of Commerce, 55 St. Paul St., on February 8.

The speaker of the evening was DR. JOSEPH BURKE of the General Electric Atomic Power Laboratory, who spoke to the joint group on atomic research from a metallurgist's viewpoint. Dr. Burke's able presentation, both verbally and by slide projection, of some of the problems relative to this field and the progressive steps taken to date in attempting to solve them was of great interest to those present.

E. WALLIN, *Secretary*

ROCKFORD BRANCH

At the regular monthly dinner meeting held March 8 in the Winnebago Room of the Faust Hotel, 34 members and guests enjoyed a very fine meal. For the business meeting which followed, 52 were in attendance at which time nominations and the election of officers took place. Elected to office for 1954 were:

President—VERN WISSEN
1st Vice-President—LEROY JOHNSON
2nd Vice-President—ROBERT JOHNSON
Secretary-Treasurer—ELLSWORTH BUDDEN
Librarian—LAWRENCE RAY

GERRY LUX of Oakite Products was introduced as the speaker of the evening. His topic was "Cleaning as Pertained to Organic Finishing."

A very lively discussion period followed with a great many of those present taking part. The Rockford Branch is sincerely grateful for being given the opportunity of having Gerry Lux at the March meeting.

E. J. BUDDEN, *Secretary-Treasurer*

SAGINAW VALLEY BRANCH

The 5th Annual Ladies' Night Party was held February 6, 1954 at Zehnders Hotel in Frankenmuth, Mich., with 270 members and guests in attendance. A delicious chicken dinner was served at tables decorated with flower centerpieces in a Valentine theme. A favor was presented to all the ladies and after a few words by PRESIDENT MANUAL BEN, dancing was enjoyed by everyone.

J. PAUL BEARDSLEY,
Recording Secretary

ST. JOSEPH VALLEY BRANCH

At the regular meeting held at the Hotel Elkhart on February 3, 24 attended the dinner and 31 were present for the technical session.

Two applications for membership were received: J. M. MURPHEY, President of the Mid-Continent Chemical Co., and LARRY BAKER, Superintendent of Triplex Plating Co., of Michigan City.

The following delegates were unanimously elected to represent the St. Joseph Valley Branch for 1954–1955: Delegates—JOHN BAYMAN, RALPH D. WYSONG, HAROLD WIESNER. Alternates—JOHN LOCKERBIE, JAMES HEDGES, and CHESTER MCDOWELL.

Ralph Wysong was appointed Chairman of the nominating committee for 1954–1955 branch officers.

RALPH BROUWER then introduced the speaker for the evening, DR. ERNEST J. WILHELM, Professor of Physical Chemistry at the University of Notre Dame and branch past president.

Dr. Wilhelm's topic was "Current Distribution and Throwing Power as Related to Electroplating." Dr. Wilhelm described three more common methods of measurement: (1) The Bent Cathode Method, (2) The Cavity Scale, (3) The Bloom and Heming Method.

The factors which control metal distribution are essentially two.

(1) Actual or secondary current distribution which is affected by

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Branch News

(a) Primary current distribution due to shape and size of part;
(b) Polarization which increases rapidly with increases of current density.

(2) Cathode efficiency at the respective current densities.

The practical applications of throwing power, polarization current densities, metal distribution as related to this theoretical analysis were brought out by Dr. Wilhelm with examples of mechanical agitation, auxiliary anodes, shields, bleeders, rack design and even plating tank design.

Although his subject was a highly technical one, Dr. Wilhelm was able to combine theory and practical application to such a degree that everyone was able to get a better understanding of why plating deposits behave as they do.

EUGENE ROTH, *Secretary-Treasurer*

SAN FRANCISCO BRANCH

At the February 11 meeting at St. Julien Restaurant, the speaker was ALAN R. BURMAN, vice-president of Cro-Plate Co., Inc., Hartford, Conn. Burman's subject was "Pressure Blast Equipment—Burring and Polishing." Twenty members and guests attended.

After Burman's talk, a short business session was held. PRESIDENT ROBERT HART called for a reading of the minutes and called upon the chairman of the nomination committee to make a report. MR. LACKEY reported that he was not ready to present the slate of candidates for office for the coming year.

HORACE J. SMITH, *Secretary-Treasurer*

TORONTO BRANCH

February 12 was a special event. Thirty delegates to the Interim Meeting were our guests and a record crowd of 98 turned out for dinner and 123 for the meeting.

In honor of the visitors, special entertainment was arranged. A very energetic young lady sang a select group of songs including "There Was An Old Sow."

FRANK GRIGGS, Sales Manager of Canadian Hanson & Van Winkle Co., Ltd., ntroduced the speaker of the evening, DICK RICHARDS, Works Manager of Canadian Hanson & Van Winkle Co., Ltd., and a well-known authority on rectifiers.

The talk featured the output characteristics of rectifiers and a cathode ray oscilloscope illustrated the various types of waves produced by different types of rectifiers. It was noted that a rectifier was a source of trouble not to be overlooked in looking for the cause of defective plate. If a rectifier circuit gets out of balance due to switch trouble or other reasons, it can still produce d-c, but the current will have a very poor wave form and even temporary interruptions.

Pictured at the Toronto Branch meeting are, left to right: Ed Hathaway, who assisted the evening's speaker, V. L. Richards

J. G. SMITH, *Branch Correspondent*

WATERBURY BRANCH

The regular monthly meeting was held on February 11 in the Colonial Room of the Hotel Elton. After the premeeting dinner, PRESIDENT FRANK EDDY gaveled the group to order and announced the death of BOB LEATHER, pioneer in the branch. A motion was made and seconded that the branch donate to the Heart Fund in memory of Bob Leather, rather than send the conventional flowers.

Then TECHNICAL CHAIRMAN BILL INNES called on DR. GEORGE DUBPERNELL to give the book review. Dr. Dubpernell reviewed three books on Waste Treatment Control, and passed them around to the membership for their inspection.

After showing of a movie, "Telephone Pioneering," Bill Innes turned the meeting over to the chairman of the nominating committee, Dr. Dubpernell, who presented the following slate for the 1954–1955 year:

President—P. J. SLOANE
1st Vice-President—J. V. PETROCELLI
2nd Vice-President—F. S. FOSTER
Secretary—S. L. HENN
Assistant Secretary—A. W. TRACY
Librarian—T. VOYDA
Assistant Librarian—E. J. GARLAND
Publicity Director—W. P. INNES

The speaker for the evening, TOM FADGEN, Laboratory Director, General Motors Corp., Ternstedt Division, Trenton, N. J., spoke on "Plating Waste Treatment by Ion Exchange." He discussed the installation of such a system in their plant, high lighting the many variables to be considered, and the various unseen problems involved. The main point of the talk was the value of making one gallon of water do the work of three gallons. Water conservation is a problem, which presents a challenge to industry and must be practiced because of the large increase in water usage for irrigation and air conditioning.

WILLIAM P. INNES,
Publicity Director

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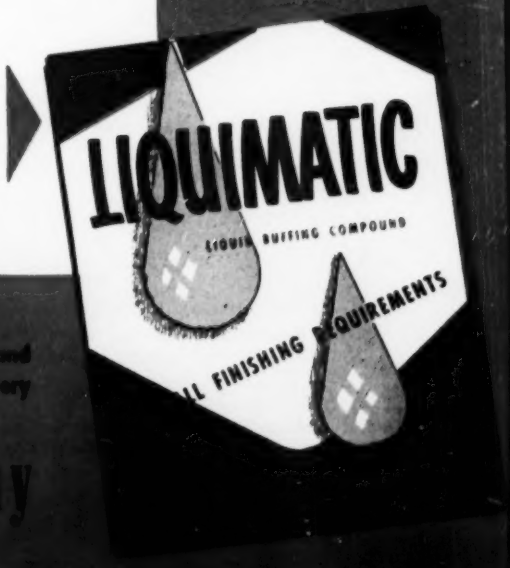

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GRAND RAPIDS, MICHIGAN

Membership Report of the AES

Elections

BALTIMORE-WASHINGTON: Dante G. Beretta, Samuel P. Grant, Walter E. Reid, Jr., Charles C. Sweglar, Edward J. Wallace

BOSTON: John J. Clooman, Jr., John Goodfellow, William V. Jennings, George Nereo, John Prudden, Edward H. Rollfs, Samuel Silbovitz, Robert C. Waterhouse, Franklin E. Welch, Jr.

CHICAGO: Herbert G. Lindberg

CINCINNATI: Joseph E. Merten

CLEVELAND: Dennis Durbin, Frank A. Rometti, Howard A. Simons

DAYTON: Emory C. Guerin

DETROIT: Alexander J. Bacon, Richard W. Clement, John S. Glass, Jeanne A. Ivinskas, J. M. Kaelin, Charles B. Kemen, Jr., Thomas Kohler, W. L. Lawrence, Martin T. McGowan, Edward J. Nichols, John M. O'Brien, William R. Ohst, A. A. Pearsen, Ann G. Piken, Buck Rogers, Theodore C. Smolinski, E. A. Ulbrich, J. Weick

GRAND RAPIDS: Russell L. Pritchard, Anthony Wanczuk

LOS ANGELES: William C. Cahill, Richard W. Dixon, Joseph H. Grevembery, Raymond J. Husband, Cedric Israel, John Mazzotti, David W. Schein, David F. Seymour, H. W. Smith, J. A. Stewart, F. L. Weiss

MELBOURNE: A. B. Simon

MILWAUKEE: R. Adrian Davis, Harold J. Durnford, Donald W. Ernst, Lawrence Hone, C. Eugene Johnson, Louis Kaplan, Robert J. Misewski, John E. Noerenberg, Richard H. Schmalfeld, Stanley R. Warwick

NEW YORK: Louis J. Boccia, Louis Bricker, John P. Church, Abraham Galfunt, Charles A. Morla, Jr., Ivor L. Simmons, R. T. Williams, Sam Yank

PHILADELPHIA: Powell Calvert, D. M. Caruso, Jr., Elmo F. Connolly, Jerome E. Cotteta, Karl Ermisch, Joseph W. Gellenthin, Warren C. Light, Robert Rodgers, Jr., Eugene G. Smith, Jack B. Vadurro

PITTSBURGH: Dale M. McMahon

ROCKFORD: Richard McGuire, Charles Miner, Marvin Olsgaard, Rene Pernot, Claude Richardson, Sr., Claude Richardson, Jr., James Sorensen

ST. JOSEPH VALLEY: Larry Baker, J. M. Murphey, Jr.

SOUTHEASTERN: James Mayo Hall, James Thomas Hall, Jr.

SPRINGFIELD: William J. Grover, Jr., Edgar F. Monat

SYRACUSE: Leonard Brightman, Nicholas Calantone, Leonard T. Crenan, John B. Davidson, Raymond K. Dunlevy, Carl L. Johns, Stephen E. Koziar, Harry F. Millis, Alfred L. Myron, John J. O'Connor, Harry M. Pooms, Stanley J. Sambora, N. Weiss, W. H. Wood

TOLEDO: George Karmel, T. J. Limmex

TORONTO: L. T. Dabrowski, J. R. Berry

Membership Competition

BRANCH	Membership April 1, 1953*	New Members	Net Change in Membership	Per Cent Net Change	Sustaining Membership Credits*
First Group					
Los Angeles	236	68	+58	+24.6	14
Detroit	504	122	+98½	+19.5	55
New York†	352	52	+37	+10.5	19
Newark	251	30	+24½	+ 9.8	11
Philadelphia	198	34	+18½	+ 9.3	11
Hartford	151	20	+13	+ 8.6	5
Milwaukee	164	51	+14	+ 8.3	8
Cleveland	236	27	+ 9	+ 3.8	18
Waterbury	130	10	+ 3½	+ 2.7	16
Chicago	477	31	+ 7½	+ 1.6	85
Pittsburgh	142	18	+ 1	+ 0.7	5
Melbourne	169	21	− 2	− 1.2	..
Grand Rapids	173	19	− 2½	− 1.4	13
Bridgeport	158	9	− 3½	− 2.2	4
Toronto	146	18	− 7	− 4.8	6
Boston	155	12	− 8½	− 5.5	6
Second Group					
Syracuse	128	48	+32	+25.0	4
Dayton	76	14	+11½	+15.1	3
Montreal	80	8	+ 8	+10.0	1
Indianapolis	105	17	+ 8	+ 7.6	1
St. Joseph Valley	78	14	+ 5½	+ 7.1	4
Baltimore-Washington	93	19	+ 6	+ 6.5	4
Twin City	71	4	+ 2½	+ 3.5	2
San Francisco	74	15	+ 2	+ 2.7	..
Saginaw Valley‡	103	19	+ 1½	+ 1.5	..
Sydney	82	11	− 1	− 1.2	..
Buffalo	106	13	− ½	− 0.5	2
Providence-Attleboro	95	6	− 2½	− 2.6	2
Cincinnati	92	5	− 4½	− 4.9	2
New Haven	100	..	− 6½	− 6.5	7
Rochester	107	11	− 9	− 8.4	3
St. Louis	109	8	−18	−16.5	10
Third Group					
Western Ontario	22	6	+ 6	+27.3	▲
Rockford	63	20	+14½	+23.0	3
Springfield	57	12	+ 9½	+16.7	2
Columbus	52	9	+ 8½	+16.3	1
Hamilton	25	3	+ 3	+12.0	1
Southeastern	50	6	+ 4	+ 8.0	1
Lancaster	69	4	+ 4	+ 5.8	2
Adelaide	52	7	+ 1	+ 1.9	..
Dallas-Fort Worth	53	6	+ 1	+ 1.9	
Toledo	56	12	+ 1	+ 1.8	3
Houston	42	1	+ ½	+ 1.2	1
Kansas City	46	6	0	0	..
Allentown-Reading	53	..	− 4	− 7.5	6
Jackson-Lansing	61	4	− 7½	−12.3	1
Louisville§	44	3	− 7½	−17.0	2
Wichita	41	3	− 7	−17.1	2
Canadian Branches, unallocated					8
Outside Competition					
Portland	...	18	.....	.....	..
At Large	138	27	+22	.....	..
Total AES	6,065	903	+366	+ 6.0	358

Active Membership, March 31, 1954 6,431

*Subject to correction. †, ‡, §Winners in first, second and third groups, respectively of 1952–1953 membership competition. ▲Proper credit to individual Canadian Branches not available.

MEMBER-AT-LARGE: Joseph J. Cizas, St. Louis, Mo.; Philippe De Pietro, Switzerland; Dr. Jan E. Garssen, Netherlands; Eugene Sutton, Hudson, Ohio

Reinstatements

BALTIMORE-WASHINGTON: Joseph H. James
CHICAGO: Edward I. Peters
JACKSON-LANSING: C. F. Gurnham
MELBOURNE: J. Perdrix
MILWAUKEE: Herman Braun, Frederick A. Rabe, Gene Rechlicz
SYRACUSE: Anthony Rotoli

Transfers

Robert J. Yackley from Newark to Chicago; F. B. Swift from Dallas-Fort Worth to Wichita; James E. Weaver to Dallas-Fort Worth from Houston; Eugene G. Gwyer to Detroit from Newark; Russell E. Reynolds from Detroit to Pittsburgh; W. D. Jeffries from New York to Syracuse; Gordon B. Packer to Saginaw Valley from Jackson-Lansing; David Kilmurray to San Francisco from Buffalo; Anthony F. Rotoli from Syracuse to Newark

Resignations

BALTIMORE-WASHINGTON: Leslie E. Guilford, A. M. Pommer, M. P. Sharp
BOSTON: Charles E. Barber, Norman J. Houle, H. James Stone
CINCINNATI: Robert R. Rechel
JACKSON-LANSING: Lawrence Henderson, Ross G. Waugh
LOUISVILLE: G. H. Hillebrand, Jr.
MELBOURNE: L. E. Chambers, J. H. Hay, G. R. Isaac, G. A. Rennie, J. R. Siddons
PHILADELPHIA: Bernard J. Conway, Samuel L. Groff
PITTSBURGH: Lowell H. Parker
SAGINAW VALLEY: Walton A. Mason
SYDNEY: A. J. Buda, K. J. Jones
TOLEDO: Carl Hoffman
MEMBER-AT-LARGE: Decio Griffini from Italy

Suspensions

BOSTON: Dean M. Boundy, Leslie W. Currier, George A. DeLorme, John Foley, Walter F. Kozak, Joseph Legere, George H. Loeser, Rudolph T. Marshall, Albert Milani, Maurice Milani, Hubert S. O'Neil, Paul R. Shepherd, John W. Skulski, Frederick Sullivan
JACKSON-LANSING: James Brakeman, Linden B. Johnson, Ray Fisher, A. E. McRae, C. C. Nicholas
LOUISVILLE: M. Clementi, M. E. Vowels
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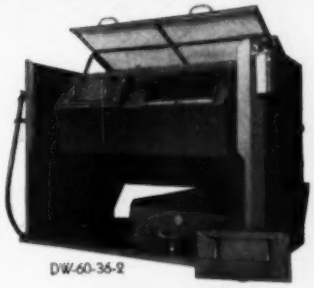
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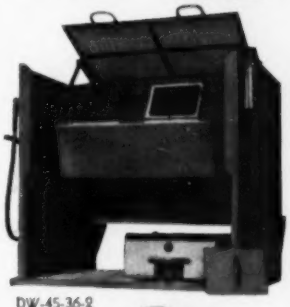
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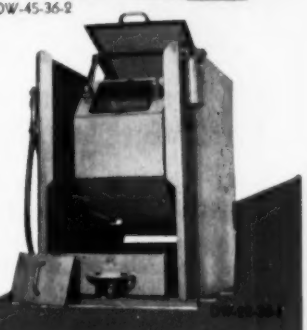

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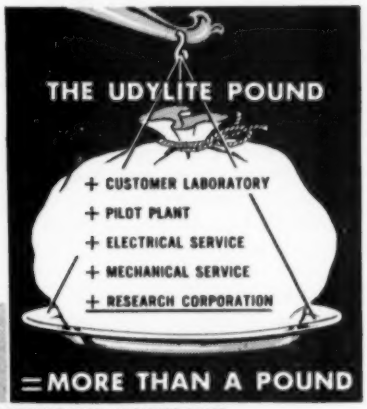

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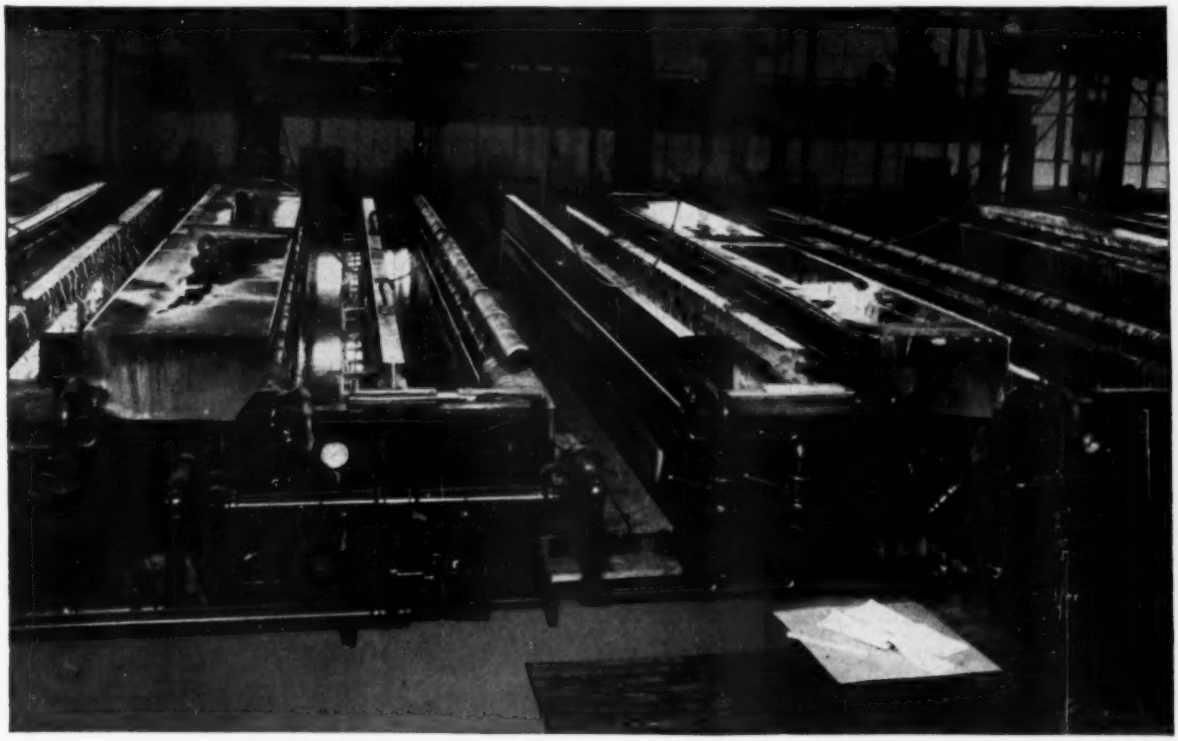

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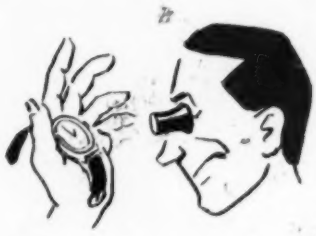

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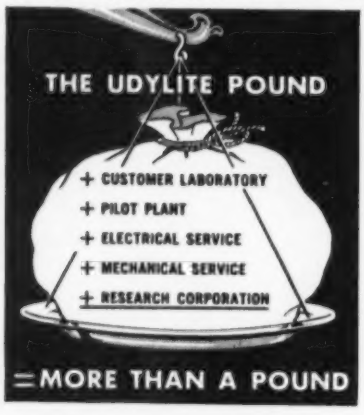

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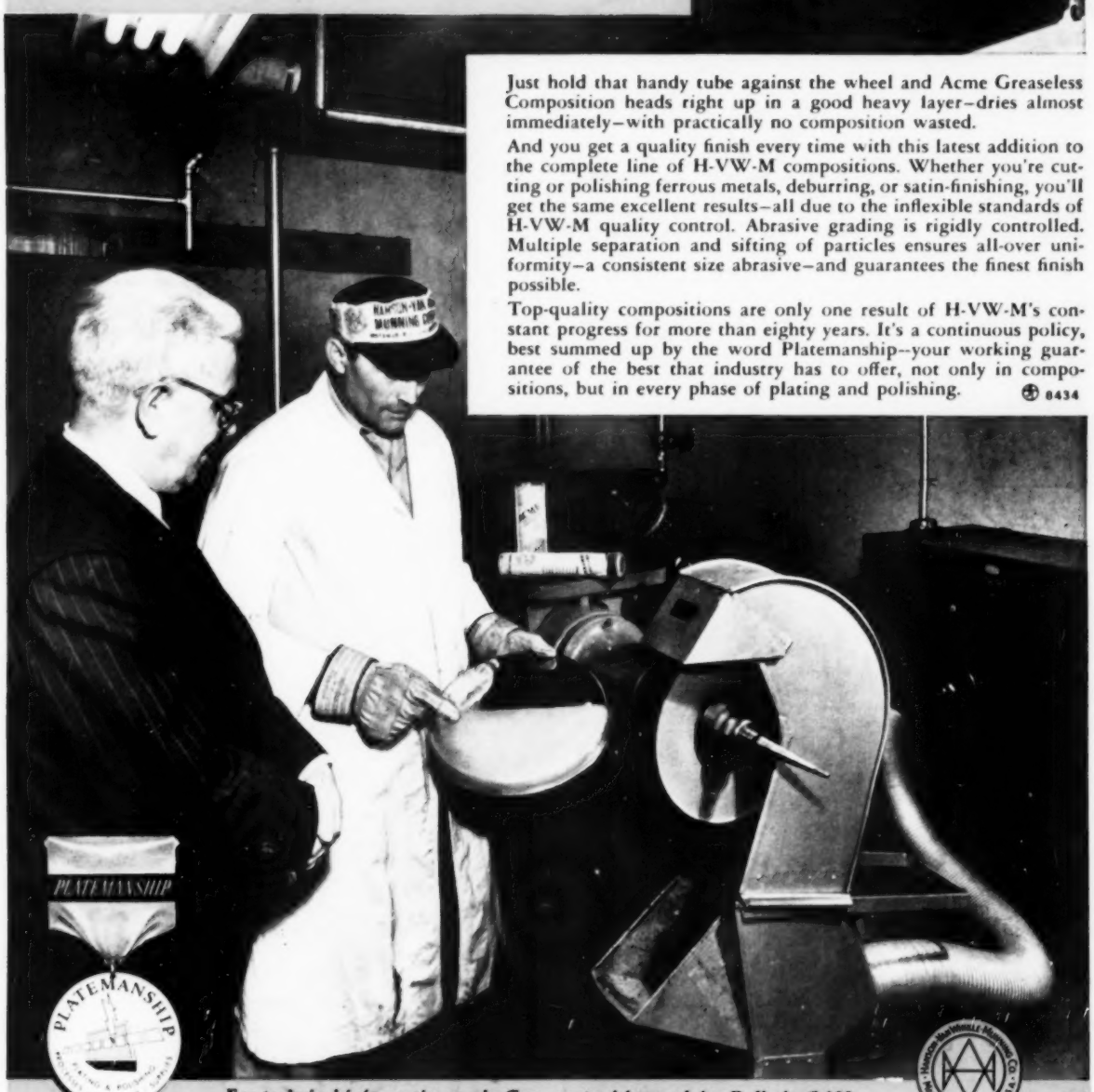

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